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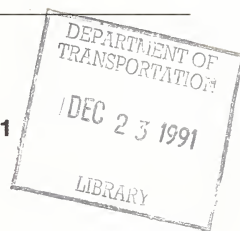


US Department  
of Transportation  
**National Highway  
Traffic Safety  
Administration**

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**DOT HS 807 760  
Final Report**

**June 1991**



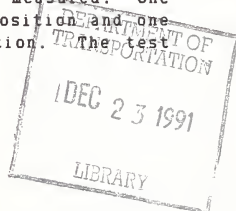
# **Evaluation of the Biosid Dummy MDB-to-Car Left Side Impact Test of a 27° Crabbed Moving Deformable Barrier into a Minicars RSV 3-Door Hatchback at 39.0 MPH**

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Technical Report Documentation Page

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16. Abstract  <p>This test report documents a crash test to evaluate the response of Side Impact dummies in a moving deformable barrier into stationary vehicle left side impact crash test at an impact velocity in excess of the FMVSS 214 specifications. This test was conducted on a Minicars RSV 3-door hatchback at the TRC Crash Test Facility, East Liberty, Ohio. The test vehicle was impacted on the left side by a moving deformable barrier, crabbed to 27°, at 39.0 mph. The test was a simulation of a 90° intersection collision with the striking vehicle travelling 35 mph and the struck vehicle travelling at 17.5 mph. Occupant responses of two side impact dummies were measured. One Biosid dummy was located in the driver's designated seating position and one Part 572 F dummy was located in the left rear seating position. The test date was May 20, 1991, and the ambient temperature was 78° F.</p> <table border="1"> <thead> <tr> <th></th> <th>DRIVER</th> <th>PASSENGER</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC)</td> <td>162</td> <td>1012</td> </tr> <tr> <td>Upper Spine Acceleration, g</td> <td>43</td> <td>120</td> </tr> <tr> <td>Left Upper Rib Acceleration, g</td> <td>87</td> <td>92</td> </tr> <tr> <td>Left Center Rib Acceleration, g</td> <td>107</td> <td>NA</td> </tr> <tr> <td>Left Lower Rib Acceleration, g</td> <td>132</td> <td>119</td> </tr> <tr> <td>Lower Spine Acceleration, g</td> <td>61</td> <td>106</td> </tr> <tr> <td>Thoracic Trauma Index (TTI(d))</td> <td>96</td> <td>113</td> </tr> <tr> <td>Pelvis Acceleration, g</td> <td>63</td> <td>114</td> </tr> </tbody> </table>							DRIVER	PASSENGER	Head Injury Criteria (HIC)	162	1012	Upper Spine Acceleration, g	43	120	Left Upper Rib Acceleration, g	87	92	Left Center Rib Acceleration, g	107	NA	Left Lower Rib Acceleration, g	132	119	Lower Spine Acceleration, g	61	106	Thoracic Trauma Index (TTI(d))	96	113	Pelvis Acceleration, g	63	114
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## SECTION 1.0

### PURPOSE AND TEST SUMMARY

#### PURPOSE

The purpose of this test was to evaluate the response of side impact dummies in a moving deformable barrier into stationary vehicle left side impact test at an impact velocity in excess of the FMVSS 214 specifications. The vehicle was tested using conditions specified in FMVSS 214, Docket No. 88-06, Notice 8 final rule with the exception of the higher impact velocity.

#### INTRODUCTION

A stationary Minicars RSV 3-door hatchback was impacted on the left side by a Moving Deformable Barrier (MDB) on May 20, 1991. The test was to simulate an intersection collision with the striking vehicle travelling at 35 mph and the struck vehicle travelling at 17.5 mph. The orientation angle of the striking vehicle was 90° counterclockwise with respect to the longitudinal axis of the struck vehicle. The leading edge of contact was to be 37 inches forward of the midpoint of the wheelbase.

To simulate this collision, the MDB was to be towed into the stationary Minicars RSV at 39.1 mph with the MDB's wheels crabbed clockwise to 27°. The actual test speed was 39.0 mph and the actual leading edge of contact was 36.5 inches forward of the midpoint of the Minicars RSV's wheelbase.

One (1) BIOSID dummy was located in the Minicars RSV driver's designated seating position and one (1) Part 572 F dummy was located in the left rear designated seating position.

Section 2.0 contains General Test and Vehicle Parameter Data. Section 3.0 contains dummy, vehicle, and moving deformable barrier data. Appendix A contains pre-test and post-test vehicle and dummy photographs. Appendix B contains Data Plots. Appendix C contains Dummy Certification Data. Appendix D contains Miscellaneous Information.



SECTION 2.0

GENERAL TEST AND VEHICLE PARAMETER DATA

### TEST RESULTS SUMMARY

This moving barrier side impact test was conducted at TRC on May 20, 1991.

The test vehicle, a Minicars RSV 3-door hatchback, was equipped with a 4 cylinder, transverse engine, and manual transmission. The vehicle's test weight was 3101 pounds. The vehicle's maximum crush was 14.0 inches.

The moving deformable barrier's speed was 39.0 mph at impact. The moving barrier's test weight was 3004 pounds.

The driver's Head Injury Criteria (HIC) was 162. The driver's Thoracic Trauma Index (TTI(d)) was 96.

The left rear passenger's HIC was 1012. The left rear passenger's Thoracic Trauma Index (TTI(d)) was 113.



TEST VEHICLE INFORMATION

VEHICLE MANUFACTURER: Minicars

MAKE/MODEL: RSV

VIN: MIRS3SSH9MOM5012

BODY STYLE: 3-door hatchback

MODEL YEAR: NA

COLOR: Silver

ENGINE DATA: TYPE: transverse CYLINDERS: 4 DISPLACEMENT: NA

TRANSMISSION DATA: 5 SPEED, X MANUAL, \_\_\_ AUTOMATIC, \_\_\_ FWD, X RWD, \_\_\_ 4WD

DATE VEHICLE RECEIVED: 05/13/91

ODOMETER READING: 314.0

DEALER'S NAME AND ADDRESS: NA

ACCESSORIES:

POWER STEERING	No	AUTOMATIC TRANSMISSION	No
POWER BRAKES	No	AUTOMATIC SPEED CONTROL	No
POWER SEATS	No	TILTING STEERING WHEEL	No
POWER WINDOWS	No	TELESCOPING STEERING WHEEL	No
TINTED GLASS	No	AIR CONDITIONING	Yes
RADIO	No	ANTI-SKID BRAKE	No
CLOCK	No	REAR WINDOW DEFROSTER	No
OTHER	None		

REMARKS:

1. IS THE VEHICLE STOCK THROUGHOUT? Yes
2. DOES VEHICLE SHOW EVIDENCE OF PRIOR ACCIDENT HISTORY? No
3. DOES VEHICLE SHOW ANY SIGNIFICANT CORROSION? No
4. CONDITION OF THE FRONT/REAR BUMPER AND FRAME: Good

CERTIFICATION DATA FROM VEHICLE'S LABEL: \*

VEHICLE MANUFACTURED BY:

DATE OF MANUFACTURE:

VIN:

GVWR: LBS

GAWR: FRONT: LBS., REAR: LBS.

\*The vehicle did not contain a label stating certification data.

TEST VEHICLE INFORMATION CONT'D

TIRES ON VEHICLE (MFR., LINE, SIZE): Dunlop/Denovo 2/Run Flat/ PCL  
200/65HR370

TIRE PRESSURE WITH MAXIMUM CAPACITY VEHICLE LOAD: FRONT: 32 PSI  
REAR: 32 PSI

SPARE TIRE (MFR., LINE, SIZE): None

TYPE OF SEATS: FRONT: Bucket  
REAR: Bench

TYPE OF FRONT SEAT BACKS: Non-adjustable

MAXIMUM WIDTH: 71.1 INCHES

WHEELBASE: 104.8 INCHES

LOCATION OF LABEL STATING TIRE & CAPACITY DATA: \*

TIRE & CAPACITY DATA FROM VEHICLE'S LABEL: \*

RECOMMENDED TIRE SIZE:

RECOMMENDED COLD TIRE PRESSURE: FRONT: PSI; REAR: PSI

DESIGNATED SEATING CAPACITY: \_\_\_\_FRONT \_\_\_\_REAR \_\_\_\_TOTAL

VEHICLE CAPACITY WEIGHT: \_\_\_\_\_ LBS.

TEST VEHICLE ATTITUDE (ALL MEASUREMENTS ARE IN INCHES):

DELIVERED ATTITUDE: LF 28.6; RF 28.8; LR 28.9; RR 28.9

FULLY LOADED ATTITUDE: LF 29.2; RF 28.9; LR 30.0; RR 29.7

PRE-TEST ATTITUDE: LF 28.6; RF 29.0; LR 28.8; RR 29.2

POST-TEST ATTITUDE: LF 28.0; RF 28.5; LR 29.4; RR 28.4

\*The vehicle did not contain a label stating tire and capacity data.

TEST VEHICLE INFORMATION CONT'D

WEIGHT OF TEST VEHICLE AS RECEIVED (WITH MAXIMUM FLUIDS):

RIGHT FRONT	564 LBS.	RIGHT REAR	750 LBS.
LEFT FRONT	600 LBS.	LEFT REAR	732 LBS.
TOTAL FRONT WEIGHT	1164 LBS.	(44.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1482 LBS.	(56.0% OF TOTAL VEHICLE WEIGHT)	
TOTAL DELIVERED WEIGHT	2646 LBS.		

CALCULATION OF TEST VEHICLE'S TARGET TEST WEIGHT:

RCLW = RATED CARGO AND LUGGAGE WEIGHT\*

UDW = UNLOADED DELIVERED WEIGHT (2646 LBS)

VCW = VEHICLE CAPACITY WEIGHT (NA)

DSC = DESIGNATED SEATING CAPACITY (NA)

RCLW\* = VCW - 150 (DSC) = 120 LBS.

TARGET TEST WEIGHT = UDW + RCLW\*\* (NO. OF SIDE IMPACT DUMMIES X 174 LBS/DUMMY)

TARGET TEST WEIGHT = 2646 + 348 + 120 \*\*

TARGET TEST WEIGHT = 3114 LBS

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND 107 LBS. OF CARGO WEIGHT:

RIGHT FRONT	677 LBS.	RIGHT REAR	812 LBS.
LEFT FRONT	729 LBS.	LEFT REAR	883 LBS.
TOTAL FRONT WEIGHT	1406 LBS.	(45.3% OF TOTAL VEHICLE WEIGHT)	
TOTAL REAR WEIGHT	1695 LBS.	(54.7% OF TOTAL VEHICLE WEIGHT)	
TOTAL TEST WEIGHT	3101 LBS.	(0.4% UNDER TARGET TEST WEIGHT)	

WEIGHT OF BALLAST SECURED IN VEHICLE CARGO AREA: 50 LBS.

COMPONENTS REMOVED TO MEET TARGET TEST WEIGHT: None

CG = 57.3 INCHES REARWARD OF FRONT WHEEL CENTERLINE

\*Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's rated cargo and luggage weight from the vehicle's label or 300 pounds, whichever is less.

\*\*A cargo weight of 120 pounds was provided by NHTSA.

POST-IMPACT DATA

TEST NUMBER: 910520

TEST DATE: 05/20/91

TEST TIME: 1516

TEST TYPE: Left side impact

IMPACT ANGLE: 270°

AMBIENT TEMPERATURE AT IMPACT AREA:

78° F

TEMPERATURE IN OCCUPANT COMPARTMENT:

78° F

IMPACT VELOCITY: PRIMARY = 39.0 MPH

SECONDARY = 39.2 MPH

DISTANCE FROM BARRIER TO VEHICLE: ENTERING VELOCITY TRAP = 26.0 IN.

EXITING VELOCITY TRAP = 2.0 IN.

### TEST CONDITIONS

TEST NUMBER: 910520

DATE OF TEST: 05/20/91

TIME OF TEST: 1516

WIND VELOCITY: 2-4 mph @ 120° E

HUMIDITY: 60%

AMBIENT TEMPERATURE AT IMPACT AREA: 78° F

TEMPERATURE IN OCCUPANT COMPARTMENT: 78° F

### SUBJECT VEHICLE DATA

	<u>ACTUAL</u>	<u>INTENDED</u>
SUBJECT VEHICLE TEST WEIGHT (lbs.)	3101	3114
MDB TEST WEIGHT (lbs.)	3004	3000
MDB VELOCITY (mph)*	39.0	39.1
IMPACT POINT (in.)**:	36.5	37.0

### DUMMIES

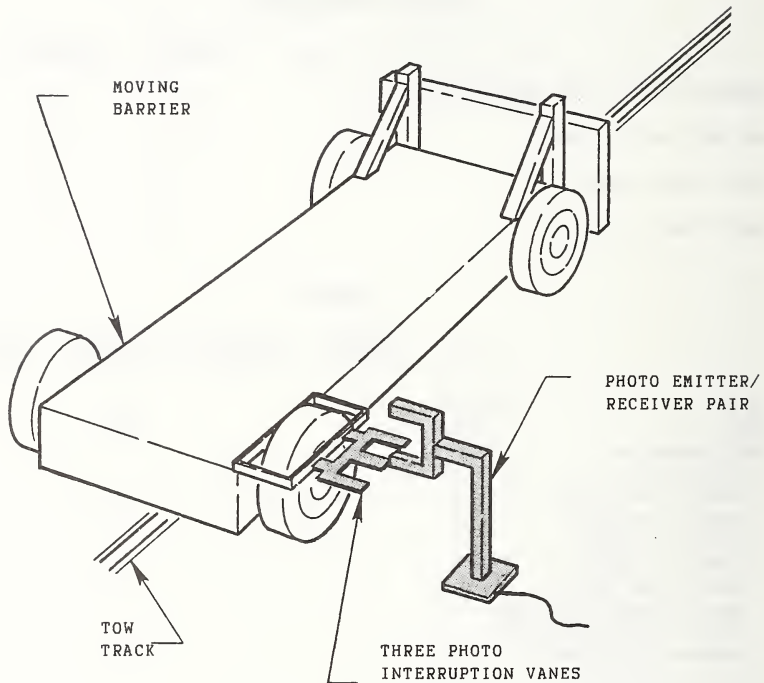
	DRIVER	MIDDLE PASSENGER	RT. FRONT PASSENGER	LEFT REAR PASSENGER	RT. REAR PASSENGER
TYPE:	BIOSID			SID	
SERIAL NO.:	002			905	
INSTRUMENTATION:					
HEAD ACCEL.:	3			3	
UPPER SPINE ACCEL.:	4			3	
UPPER RIB ACCEL.:	2			2	
CENTER RIB ACCEL.:	2				
LOWER RIB ACCEL.:	2			2	
LOWER SPINE ACCEL.:	4			4	
UPPER ABDOMEN RIB ACCEL.:	1				
LOWER ABDOMEN RIB ACCEL.:	1				
ABDOMEN DISPLACEMENT:	2				
PELVIS ACCEL.:	3			3	
RIB DISPLACEMENT:	3			1	
SHOULDER ACCELS.:	1				
SHOULDER DISPLACEMENT:	1				
RESTRAINT SYSTEM:	DRIVER'S AIRBAG			THREE-POINT UNIBELT	

### REMARKS:

\*AS MEASURED OVER FINAL ONE FOOT OF TRAVEL.

\*\*AS MEASURED FORWARD OF THE SUBJECT VEHICLE'S WHEELBASE MIDPOINT.

IMPACT VELOCITY MEASUREMENT SYSTEM



The final vane clears emitter/receiver two inches before impact.

The vanes have one foot spacing.

SECTION 3.0

DUMMY, VEHICLE, AND MOVING DEFORMABLE BARRIER DATA

# DUMMY DATA SUMMARY

TEST NUMBER 910520

## DRIVER DUMMY

SN: 002

POSITIVE DIRECTION		NEGATIVE DIRECTION	
MAX	MSEC	MAX	MSEC

### HEAD

LONGITUDINAL ACCEL. (g)	29.7	234.5	11.5	56.5
LATERAL ACCEL. (g)	23.3	69.6	12.1	174.0
VERTICAL ACCEL. (g)	6.8	22.4	40.1	51.3
RESULTANT ACCEL. (g)	43.7	51.3		
HIC	162 FROM 37.0 TO 73.0			

### LEFT SHOULDER

LATERAL ACCEL. (g)	55.1	35.0	21.5	63.1
DELTA V (MPH)	26.7	61.1		
LATERAL DISPL. (in)	1.2	41.4	0.0	93.1

### UPPER SPINE

LONGITUDINAL ACCEL. (g)	6.3	68.8	7.8	80.0
LATERAL (P) ACCEL. (g)	42.7	36.3	7.3	68.8
DELTA V (MPH)	25.0	55.2		
LATERAL (R) ACCEL. (g)	42.3	35.6	7.3	68.1
DELTA V (MPH)	24.0	55.8		
VERTICAL ACCEL. (g)	6.4	38.8	6.3	69.4
RESULTANT (P) ACCEL. (g)	43.1	36.3		
RESULTANT (R) ACCEL. (g)	42.6	35.6		

### LEFT UPPER THORAX RIB

LATERAL (P) ACCEL. (g)	87.0	31.9	10.6	80.6
DELTA V (MPH)	27.8	75.2		
LATERAL (R) ACCEL. (g)	89.1	31.3	9.9	80.0
DELTA V (MPH)	27.7	75.1		
LATERAL DISPL. (in)	1.2	42.8	0.0	155.1

### LEFT CENTER THORAX RIB

LATERAL (P) ACCEL. (g)	107.1	31.3	11.6	72.5
DELTA V (MPH)	28.7	69.1		
LATERAL (R) ACCEL. (g)	111.8	31.3	12.3	72.5
DELTA V (MPH)	29.4	68.9		
LATERAL DISPL. (in)	1.3	43.0	0.0	229.9

### LEFT LOWER THORAX RIB

LATERAL (P) ACCEL. (g)	131.7	31.9	15.3	70.6
DELTA V (MPH)	30.7	67.5		
LATERAL (R) ACCEL. (g)	131.4	31.9	16.3	70.6
DELTA V (MPH)	31.5	67.4		
LATERAL DISPL. (in)	1.4	42.9	0.0	66.0



# DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 910520

## DRIVER DUMMY

SN: 002

POSITIVE DIRECTION		NEGATIVE DIRECTION	
MAX	MSEC	MAX	MSEC

### THORACIC TRAUMA INDEX

TTI (P)	96.1
TTI (R)	96.6

### LOWER SPINE

LONGITUDINAL ACCEL. (g)	14.5	32.5	7.9	48.8
LATERAL (P) ACCEL. (g)	60.5	39.4	9.6	93.8
DELTA V (MPH)	26.0	55.0		
LATERAL (R) ACCEL. (g)	61.7	39.4	8.8	90.6
DELTA V (MPH)	26.3	54.1		
VERTICAL ACCEL. (g)	20.6	39.4	5.4	63.1
RESULTANT (P) ACCEL. (g)	63.9	39.4		
RESULTANT (R) ACCEL. (g)	65.0	39.4		

### LEFT UPPER ABDOMEN

LATERAL ACCEL. (g)	127.9	26.9	22.7	40.6
DELTA V (MPH)	30.4	68.1		
LATERAL DISPL. (in)	2.1	42.6	0.0	12.4

### LEFT LOWER ABDOMEN

LATERAL ACCEL. (g)	103.9	21.3	25.9	41.2
DELTA V (MPH)	32.7	68.5		
LATERAL DISPL. (in)	2.7	42.5	0.1	97.0

### PELVIS

LONGITUDINAL ACCEL. (g)	4.5	44.4	18.2	39.4
LATERAL ACCEL. (g)	63.4	34.4	6.5	160.6
DELTA V (MPH)	28.5	68.1		
VERTICAL ACCEL. (g)	6.3	51.3	8.9	40.6
RESULTANT ACCEL. (g)	63.6	34.4		

### POSITIVE DIRECTION

LONGITUDINAL:	FORWARD
LATERAL:	RIGHTWARD
VERTICAL:	UPWARD

### NEGATIVE DIRECTION

LONGITUDINAL:	REARWARD
LATERAL:	LEFTWARD
VERTICAL:	DOWNWARD

### NOTES:

For dummy channels Delta V is the velocity change at the approximate time of separation from the contact area.

(P) Primary Sensor  
(R) Redundant Sensor

# DUMMY DATA SUMMARY

TEST NUMBER 910520

## PASSENGER DUMMY

SN: 905

POSITIVE DIRECTION		NEGATIVE DIRECTION	
MAX	MSEC	MAX	MSEC

### HEAD

LONGITUDINAL ACCEL. (g)	9.4	32.8	21.9	46.4
LATERAL ACCEL. (g)	159.8	43.3	12.7	175.5
VERTICAL ACCEL. (g)	56.7	48.1	45.8	42.4
RESULTANT ACCEL. (g)	161.6	43.3		
HIC	1012 FROM 41.6 TO 50.4			

### UPPER SPINE

LONGITUDINAL ACCEL. (g)	11.4	69.4	25.8	37.5
LATERAL ACCEL. (g)	120.4	40.6	22.6	65.0
DELTA V (MPH)	29.4	56.8		
VERTICAL ACCEL. (g)	6.2	68.8	18.7	36.9
RESULTANT ACCEL. (g)	122.3	40.6		

### LEFT UPPER THORAX RIB

LATERAL (P) ACCEL. (g)	91.9	30.0	13.2	108.1
DELTA V (MPH)	28.1	78.9		
LATERAL (R) ACCEL. (g)	92.1	30.0	13.7	108.1
DELTA V (MPH)	27.6	68.2		

### LEFT LOWER THORAX RIB

LATERAL (P) ACCEL. (g)	119.2	28.1	25.3	55.6
DELTA V (MPH)	28.0	51.6		
LATERAL (R) ACCEL. (g)	114.9	28.1	25.3	55.6
DELTA V (MPH)	28.1	51.6		

### THORACIC TRAUMA INDEX

TTI (P)	112.6
TTI (R)	110.7

### LOWER SPINE

LONGITUDINAL ACCEL. (g)	11.3	48.8	32.8	33.1
LATERAL (P) ACCEL. (g)	106.0	34.4	28.9	58.8
DELTA V (MPH)	32.6	49.9		
LATERAL (R) ACCEL. (g)	106.5	34.4	28.6	58.8
DELTA V (MPH)	32.4	49.8		
VERTICAL ACCEL. (g)	4.6	68.8	4.6	35.0
RESULTANT (P) ACCEL. (g)	110.5	34.4		
RESULTANT (R) ACCEL. (g)	111.0	33.7		

# DUMMY DATA SUMMARY CONTINUED

TEST NUMBER 910520

## PASSENGER DUMMY

SN: 905

	POSITIVE DIRECTION		NEGATIVE DIRECTION	
	MAX	MSEC	MAX	MSEC
CHEST DISPLACEMENT				
LATERAL (in)	1.8	57.1	0.0	170.0
PELVIS				
LONGITUDINAL ACCEL. (g)	8.9	85.0	30.1	35.0
LATERAL ACCEL. (g)	113.7	30.0	16.1	80.0
DELTA V (MPH)	30.4	53.8		
VERTICAL ACCEL. (g)	9.9	29.4	5.1	85.0
RESULTANT ACCEL. (g)	114.8	30.0		

### POSITIVE DIRECTION

LONGITUDINAL: FORWARD  
LATERAL: RIGHTWARD  
VERTICAL: UPWARD

### NEGATIVE DIRECTION

LONGITUDINAL: REARWARD  
LATERAL: LEFTWARD  
VERTICAL: DOWNWARD

### NOTES:

For dummy channels Delta V is the velocity change at the approximate time of separation from the contact area.

(P) Primary Sensor  
(R) Redundant Sensor

POST-IMPACT DUMMY/VEHICLE DATA

VISIBLE DUMMY CONTACT POINTS:

	<u>DRIVER #002</u>	<u>PASSENGER #905</u>
HEAD	<u>Left door inner panel</u> <u>&amp; front headliner</u>	<u>B-pillar</u>
CHEST	<u>Left door inner panel</u>	<u>Left side panel</u>
ABDOMEN	<u>None</u>	<u>None</u>
LEFT KNEE	<u>Left door inner panel</u>	<u>Left side panel</u>
RIGHT KNEE	<u>None</u>	<u>None</u>

DOOR OPENING:

	<u>LEFT</u>	<u>RIGHT</u>
FRONT	<u>Tools required</u>	<u>Easy</u>
REAR	<u>NA</u>	<u>NA</u>

SEAT MOVEMENT:

	<u>SEAT BACK FAILURE</u>	<u>SEAT SHIFT</u>
FRONT	<u>None</u>	<u>None</u>
REAR	<u>None</u>	<u>None</u>

GLAZING DAMAGE:

The left side door glass was cracked upon impact.

The left side of the windshield was cracked upon  
impact.

OTHER NOTABLE IMPACT EFFECTS:

None

\_\_\_\_\_

\_\_\_\_\_

## DUMMY KINEMATIC SUMMARY

### DRIVER DUMMY

Upon impact, the driver dummy's head rotated to the left, impacting the left inner door panel. The left side of the dummy's chest and the dummy's left leg contacted the left inner door panel. The dummy's head and upper torso rotated forward as the dummy rebounded toward the right. The dummy's head contacted the windshield headliner. The dummy came to rest in the center of the vehicle, leaning forward.

### LEFT REAR PASSENGER DUMMY

Upon impact, the left rear passenger dummy's head rotated toward the left and contacted the B-pillar. The left side of the dummy's chest and the dummy's left leg contacted the left inner side panel. The dummy was restrained by the three-point unbelt. The dummy's head then rotated toward the right. The dummy came to rest seated in the left rear passenger's seat, restrained by the three-point unbelt.

#### DUMMY TEMPERATURE CONTROL AND POSITIONING

The vehicle was kept inside the temperature controlled crash test building until approximately 2 hours prior to the test. Temperatures inside the vehicle and ambient temperature at the crash area were recorded. Dummy temperature while outside the crash test building was maintained by shading the vehicle with tarps until approximately 1 minute prior to the test.

The following Side Impact Dummy Seating Procedure summarizes the steps taken to position the instrumented, calibrated dummies in the test vehicle.

## SIDE IMPACT DUMMY SEATING PROCEDURE

### 1. SEAT POSITIONING

- A. Place seat at the longitudinal midpoint of fore to aft adjustment (forward most locking position to rear most locking position). If no locking position is available at mid-travel, use the position immediately rearward of mid-travel.
- B. If the seat back angle is adjustable, place it in the manufacturer's stated nominal design location. If not specified, set it at the first detent rearward of 25°.
- C. Adjustable head restraints are set so that the top surface of the restraint is level with the cg of the dummy's head.
- D. If the seat is equipped with adjustable side or lumbar supports, they are set in their "released" or full back positions.
- E. All other seat adjustments are positioned to their mid-travel locations. If locking positions are not available at these mid-points, use the position immediately rearward, down, left or clockwise of mid-travel. Clockwise is defined looking rear to front or left to right relative to the vehicle. This also applies to adjustable steering columns.

### 2. H-POINT DETERMINATION

- A. The SAE three-dimensional H-point machine (SAE J826 APR80 - 50th percentile male configuration) is used to locate the H-point for each surrogate.
- B. The H-point machine is positioned on the seat as follows:
  - 1. Bucket or Contoured Seats - The H-point machine is centered on the bucket or contour such that its midsagittal plane is vertical and longitudinal.

## 2. Bench Seats

- a. Driver position. The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and contains the steering wheel center point.
- b. Outboard passenger positions. The H-point machine is positioned such that its midsagittal plane is vertical, longitudinal, and the same distance from the longitudinal vehicle centerline as that for the driver position.
- c. Center passenger positions. The H-point machine is positioned such that its midsagittal plane is vertical and contains the longitudinal vehicle centerline.

C. Locate the H-point position using the steps outlined in sections 4 through 6 of SAE Standard J826 APR80, unless otherwise specified in section 1 or 2 of this document. Record the coordinates of this point, relative to the vehicle, for use in sections 3 and 4 of this document.

## 3. BIOSID DUMMY POSITIONING PROCEDURE

### A. DRIVER

1. The upper torso of the dummy shall rest against the seat back. The midsagittal plane of the test dummy shall be (1) vertical, (2) parallel to the vehicle's longitudinal centerline, and (3) pass through the center of the steering wheel rim (bench seat) or coinciding with the longitudinal centerline of the bucket seat (bucket seat).
2. The inner surface of the lower end of the arm shall be in contact with the upper torso jacket of the dummy. The longitudinal centerline of the arm should be parallel to the coronal plane (y-z plane of the torso).
3. The "H" point of the dummy shall be positioned within one-half (0.5) inch (12.5 mm) of the required "H" point location as determined using the SAE J826 manikin.



4. The pelvic angle should be between 21 and 25 degrees from the horizontal, sloping upward toward the front of the vehicle. Note: The BIOSID uses the same pelvic angle gage as the Hybrid III-50th.
5. The dummy's upper legs should be positioned symmetrical about the midsagittal plane with a spacing between the knees of 10.3 inches (262 mm) measured from the outboard surface of the knee castings. If practical, both legs of the dummy should be in the vertical and longitudinal planes and the knees should be level.
6. The right foot of the dummy should rest on the accelerator with the heel resting as far forward as possible on the floorpan. The left foot should be set perpendicular to the lower leg with the heel resting on the floorpan in the same lateral line as the right heel.

#### B. REAR PASSENGER

1. The upper torso of the dummy should rest against the seat back. The midsagittal plane of the dummy is vertical and parallel to the vehicle's longitudinal centerline, and, if possible, the same distance from the vehicle's longitudinal centerline as the midsagittal plane of the dummy in the driver position (bench seat), or coincides with the longitudinal centerline of the bucket seat (bucket seat). If this is not possible, then the dummy should be positioned so the outermost point of the skin of the upper torso just touches the innermost surface of the vehicle adjacent to the dummy.
2. The arm position shall be set in the same manner as with the driver.
3. The "H" point of the dummy shall be positioned within one-half (0.5) inch (12.5 mm) of the "H" point location as determined using the SAE J826 manikin.
4. The pelvic angle should be the same as that specified for the driver.
5. The upper legs should be set in the same manner as the driver.

#### 4. POSITIONING PROCEDURE FOR THE PART 572 SUBPART F TEST DUMMY

A. Position a correctly configured test dummy, conforming to subpart F of Part 572, in the front outboard seating position on the side of the test vehicle to be struck by the moving deformable barrier and position another conforming test dummy in the rear outboard position on the same side of the vehicle. Each test dummy is restrained using all available belt systems in all seating positions where such belt restraints are provided. In addition, any folding armrest is retracted.

#### B. TORSO

##### 1. FOR A TEST DUMMY IN THE DRIVER POSITION

- a. For a bench seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and passes through the center of the steering wheel.
- b. For a bucket seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and coincides with the longitudinal centerline of the bucket seat.

##### 2. FOR A TEST DUMMY IN THE FRONT OUTBOARD PASSENGER POSITION

- a. For a bench seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and the same distance from the vehicle's longitudinal centerline as would be the midsagittal plane of a test dummy positioned in the driver position under 4.B.1(a).

- b. For a bucket seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and coincides with the longitudinal centerline of the bucket seat.

3. FOR A TEST DUMMY IN EITHER OF THE REAR OUTBOARD PASSENGER POSITIONS

- a. For a bench seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and, if possible, the same distance from the vehicle's longitudinal centerline as the midsagittal plane of a test dummy positioned in the driver position under 4.B.1(a). If it is not possible to position the test dummy so that its midsagittal plane is parallel to the vehicle longitudinal centerline and is at this distance from the vehicle's longitudinal centerline, the test dummy is positioned so that some portion of the test dummy just touches, at or above the seat level, the side surface of the vehicle, such as the upper quarter panel, an armrest, or any interior trim (i.e., either the broad trim panel surface or a smaller, localized trim feature).
- b. For a bucket or contoured seat. The upper torso of the test dummy rests against the seat back. The midsagittal plane of the test dummy is vertical and parallel to the vehicle's longitudinal centerline, and coincides with the longitudinal centerline of the bucket or contoured seat.

## C. PELVIS

### 1. H-POINT

The H-points of each test dummy coincide within 1/2 inch in the vertical dimension and 1/2 inch in the horizontal dimension of a point 1/4 inch below the position of the H-point determined by using the equipment for the 50th percentile and procedures specified in SAE J826 (1980), except that Table 1 of SAE J826 is not applicable. The length of the lower leg and thigh segments of the H-point machine are adjusted to 16.3 and 15.8 inches, respectively.

### 2. PELVIC ANGLE

As determined using the pelvic angle gauge (GM drawing 78051-532 incorporated by reference in part 572, subpart E which is inserted into the H-point gauging hole of the dummy, the angle of the plane of the surface on the lumbar-pelvic adaptor on which the lumbar spine attaches is 23 to 25 degrees from the horizontal, sloping upward toward the front of the vehicle.

## D. LEGS

### 1. FOR A TEST DUMMY IN THE DRIVER POSITION.

The upper legs of each test dummy rest against the seat cushion to the extent permitted by placement of the feet. The left knee of the dummy is positioned such that the distance from the outer surface of the knee pivot bolt to the dummy's midsagittal plane is six inches. To the extent practicable, the left leg of the test dummy is in a vertical longitudinal plane.

2. FOR A TEST DUMMY IN THE OUTBOARD PASSENGER POSITIONS

The upper legs of each test dummy rest against the seat cushion to the extent permitted by placement of the feet. The initial distance between the outboard knee clevis flange surfaces is 11.5 inches. To the extent practicable, both legs of the test dummies in outboard passenger positions are in vertical longitudinal planes. Final adjustment to accommodate placement of feet in accordance with Section E for various passenger compartment configurations is permitted.

E. FEET

1. FOR A TEST DUMMY IN THE DRIVER POSITION

The right foot of the test dummy rests on the undepressed accelerator with the heel resting as far forward as possible on the floorpan. The left foot is set perpendicular to the lower leg with the heel resting on the floorpan in the same lateral line as the right heel.

2. FOR A TEST DUMMY IN THE FRONT OUTBOARD PASSENGER POSITION

The feet of the test dummy are placed on the vehicle's toeboard with the heels resting on the floorpan as close as possible to the intersection of the toeboard and floorpan. If the feet cannot be placed flat on the toeboard, they are set perpendicular to the lower legs and placed as far forward as possible so that the heels rest on the floorpan.

3. FOR A TEST DUMMY IN EITHER OF THE REAR OUTBOARD PASSENGER POSITIONS

The feet of the test dummy are placed flat on the floorpan and beneath the front seat as far as possible without front seat interference. If necessary, the distance between the knees can be changed in order to place the feet beneath the seat.

## 5. FINAL POSITIONING

- A. Prior to conducting the test, the dummy position is visually checked. The dummy is to be properly positioned laterally with its midsagittal plane vertical and longitudinal, and the upper torso resting against the seat back. The H-point and pelvis angle are to be within the specified ranges and the foot, knee, and leg placements are to be as outlined. The COTR is to be satisfied with the final dummy position and any deviations from this procedure are to be approved by the COTR.
- B. The final dummy position is recorded. These measurements are to include, but not be limited to, pelvis and head angles as well as actual H-point and head cg locations relative to the vehicle. The straight-line distance from the H-point to the center of the outer ankle bolt is also recorded for one of the legs (eg. left H-point to left angle bolt).

# DUMMY IN-VEHICLE POSITION RECORDING SHEET

MFR./MAKE/MODEL: Minicars/RSV/Pacer

SEAT TYPE:        Bench

       X Bucket

       Split bench

ADJUSTER TYPE:        X Manual

       Power

       Non-adjustable

## TECHNICIANS:

BUCKET SEAT BACK TYPE:        X Non-adjustable

       Adjustable reclining

POSITIONING DATE:        05/20/91

AMBIENT TEMP.:        78° F TIME:        1215

1.        R. Branham

2.        D. Carpenter

3.        P. Cummins

4.       

DRIVER DUMMY\* # 002 TYPE: BIOSID

Head -10°

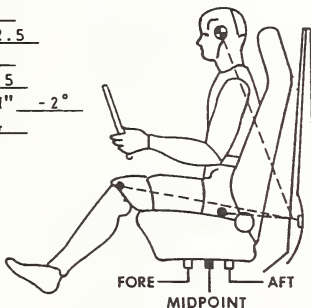
Target 52.5

Knee 108°

Joint 17.5

Approx. "H" -2°

Point 5.4



BACK SEAT DRIVER

SIDE DUMMY\*\* # 905 TYPE: S72F

Head 49°

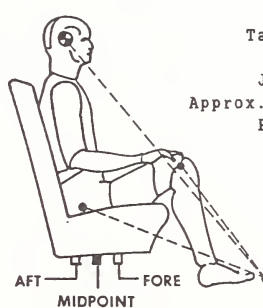
Target 48.4

Knee 53°

Joint 17.6

Approx. "H" 82°

Point 30.6



10.0

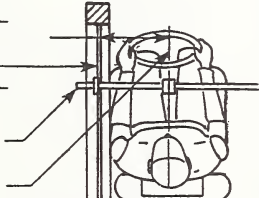
DOOR GLASS

HEIGHT = 13.5

LATERAL BAR

ADJUSTABLE

POINTER

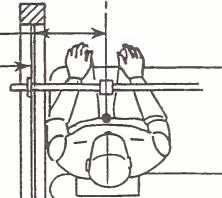


DRIVER DUMMY

14.0

DOOR GLASS

HEIGHT = 4.5

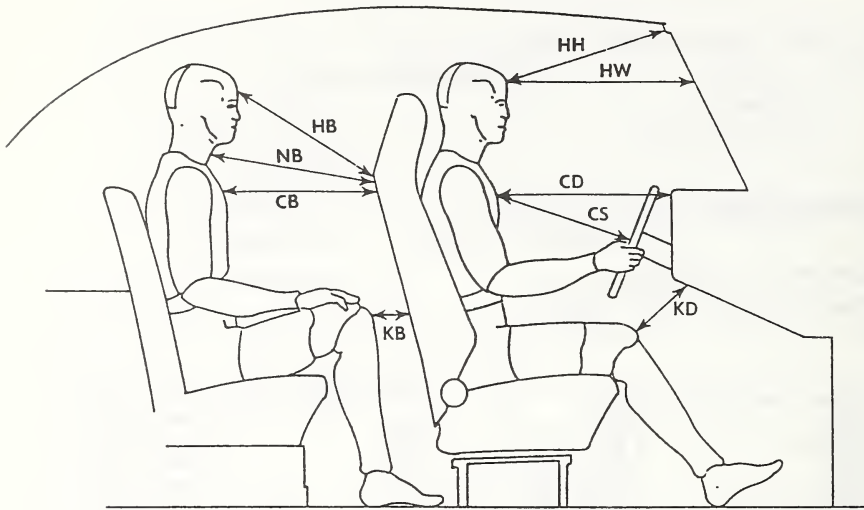


PASSENGER DUMMY

\*Driver dummy measurements are referenced to top of striker bolt and all angles referenced to vertical.

\*\*Passenger dummy measurements are referenced to front seat back latch bolt with front seat in mid-position and all angles are referenced to vertical.

# DUMMY LONGITUDINAL CLEARANCE DIMENSIONS

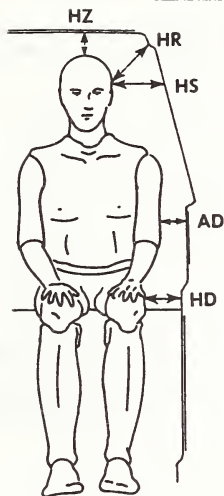


	REAR DRIVER'S	
	DRIVER	SIDE PASSENGER
HH	11.6	NA
HW	19.8	NA
CD	21.8	NA
CS	10.0	NA
KDL	1.9	NA
KDR	1.8	NA
HB	NA	22.1
NB	NA	20.6
CB	NA	16.9
KBL	NA	1.2
KBR	NA	1.5

ALL MEASUREMENTS ARE IN INCHES.

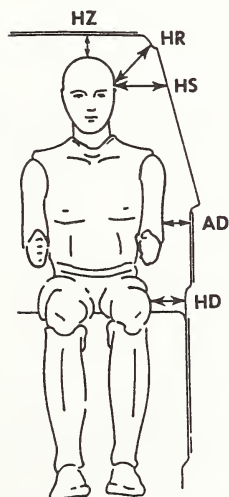


# DUMMY LATERAL CLEARANCE DIMENSIONS



	DRIVER	REAR DRIVER'S SIDE PASSENGER
--	--------	---------------------------------

HR	5.6	4.8
HS	9.4	6.8
AD	1.2	2.8
HD	2.5	4.1
HZ	1.5	1.9



ALL DISTANCE MEASUREMENTS ARE IN INCHES.

# SAE 3D H-POINT MACHINE LOCATION AND DUMMY LOCATION DATA

	DRIVER #002	PASSENGER #905
SAE 3D H-POINT MACHINE LOCATION:	X = -1.00	X = -24.00
	Z = 6.25	Z = 3.85
DUMMY H-POINT LOCATION:	X = -0.50	X = -23.50
	Z = 6.35	Z = 4.1
DUMMY PELVIC ANGLE:	21°	25°

The H-point location measurements are referenced to the left door lower center striker bolt in two-dimensional rectangular coordinates:

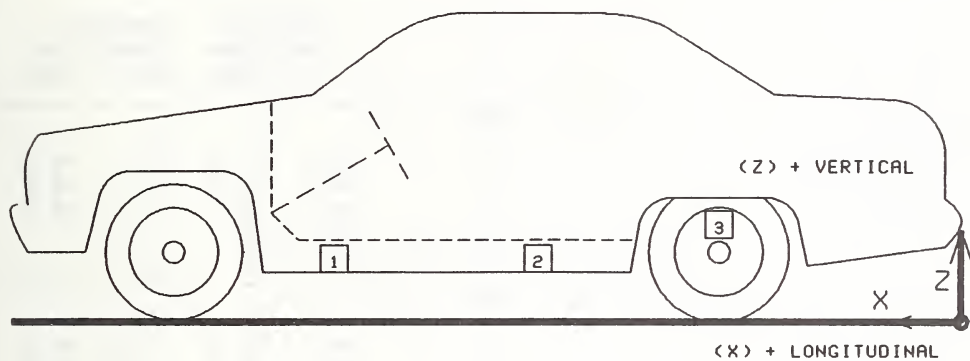
+X = Forward

+Z = Upward

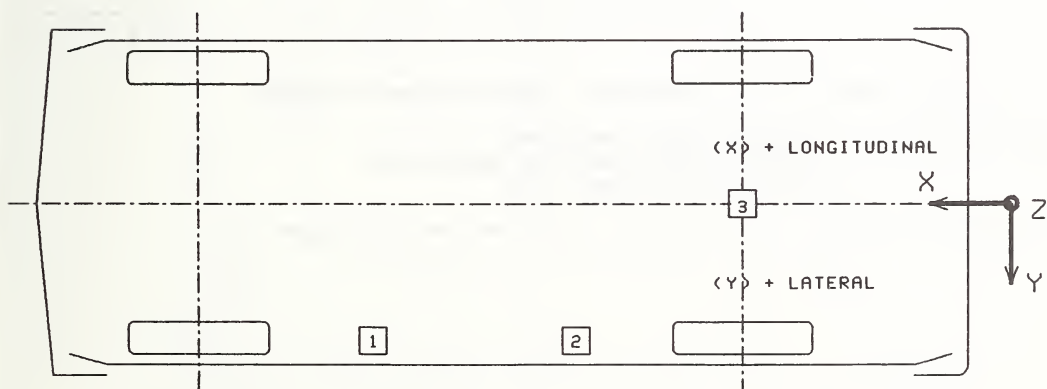
All dimensions are in inches except as noted.

Pelvis angles are referenced to horizontal, positive is upward toward the front of the vehicle.

# VEHICLE ACCELEROMETER PLACEMENT



SIDE VIEW



BOTTOM VIEW

# VEHICLE ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910520

No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX G MSEC		MAX G MSEC	
1	RIGHT SILL AT FRONT SEAT	101.9	22.6	14.8				
	LONGITUDINAL				2.5	11.5	7.5	18.0
	LATERAL				28.9	11.8	1.5	95.5
	VERTICAL				9.8	12.5	5.3	89.3
	RESULTANT				30.5	11.8		
	Delta VY is 18.6 MPH @ 93.4 MSEC							
2	RIGHT SILL AT REAR SEAT	60.6	22.4	14.2				
	LONGITUDINAL				4.1	89.0	7.4	16.9
	LATERAL				47.3	11.0	4.4	61.6
	VERTICAL				13.0	12.4	4.8	17.9
	RESULTANT				48.6	11.1		
	Delta VY is 17.3 MPH @ 58.6 MSEC							
3	REAR DECK OVER AXLE	32.8	-0.3	33.9				
	LONGITUDINAL				4.5	90.5	9.3	54.5
	LATERAL				30.3	11.1	1.8	149.1
	VERTICAL				7.6	34.9	14.1	21.9
	RESULTANT				31.3	11.1		
	Delta VY is 19.5 MPH @ 110.1 MSEC							

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM REAR BUMPER  
Y: + RIGHTWARD FROM VEHICLE CENTERLINE  
Z: + UPWARD FROM GROUND LEVEL

All measurements of accelerometer locations are in inches.

# VEHICLE EXTERIOR PROFILES AND STATIC CRUSH

ZERO DISTANCE AT PROJECTED IMPACT POINT\*

TOP WIDTH: 36.1; WHEELBASE: 104.8

WIDTH: 71.1; TRACK: 61.8; LENGTH: 177.9; OVERHANG: FRONT: 43.0; REAR: 29.8

LOCATION HEIGHT(IN) -6 0 6 12 18 24 30 36 42 48 54 60 66 72 78

## PRE-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE\*\*)

Axle Height	11.4	X	15.3	21.0	20.9	20.8	20.9	20.6	20.6	20.4	20.4	20.1	20.6	20.0	X
H-point	21.2	X	12.1	12.4	12.1	12.2	12.2	12.0	12.0	11.8	12.1	12.1	11.9	12.2	X
Mid Door	22.5	X	12.1	12.2	12.0	12.1	12.1	11.8	11.9	11.8	12.0	11.9	11.8	12.0	12.8
Window Sill	33.9	15.0	15.0	14.6	14.6	14.8	14.8	14.5	14.6	14.5	14.8	14.6	14.4	14.8	14.8
Window Top	54.2	X	X	X	X	X	X	30.9	30.8	30.7	30.6	30.6	30.5	30.0	30.6

## POST-TEST PROFILE (DISTANCE IN INCHES FROM REFERENCE PLANE\*\*)

Axle Height	11.4	X	16.5	22.9	23.1	24.1	24.2	24.4	24.6	25.2	25.9	26.5	25.9	26.2	25.4	X
H-point	21.2	X	16.4	20.6	22.5	22.2	23.0	23.6	23.6	24.4	25.1	25.5	25.9	26.2	20.2	X
Mid Door	22.5	X	16.4	19.2	21.7	22.0	22.2	23.1	23.2	23.8	24.4	24.8	25.2	26.0	20.0	18.9
Window Sill	33.9	16.2	16.6	19.1	20.9	22.5	23.2	24.1	24.4	25.1	25.4	26.1	26.2	26.5	22.2	16.3
Window Top	54.2	X	X	X	X	X	X	30.8	31.2	30.5	32.0	32.2	32.5	32.1	33.0	32.9

## STATIC CRUSH (IN)

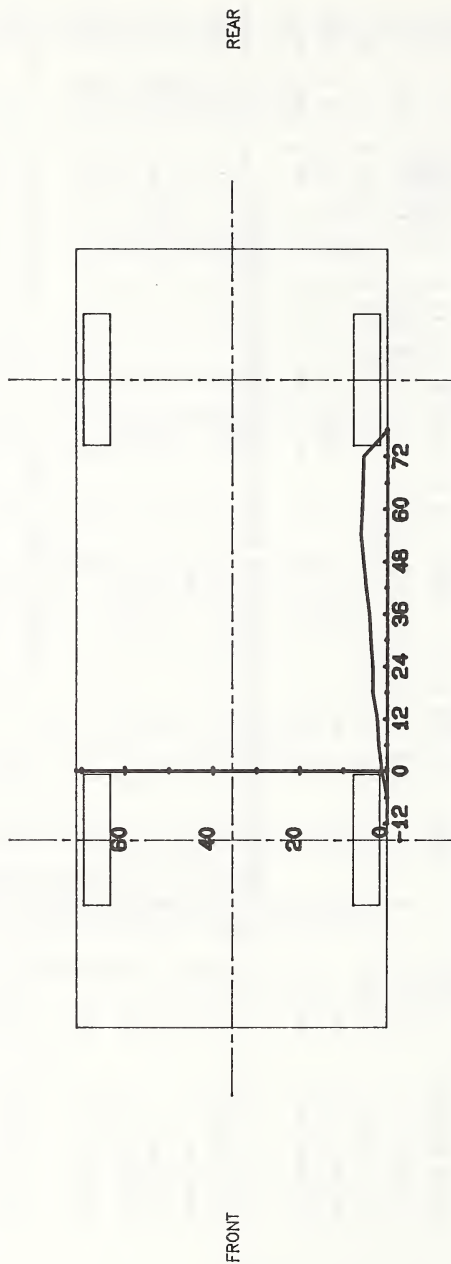
Axle Height	11.4	X	1.2	1.9	2.2	3.3	3.3	3.8	4.0	4.8	5.5	6.1	5.8	5.6	5.4	X
H-point	21.2	X	4.3	8.2	10.4	10.0	10.8	11.6	11.6	12.6	13.0	13.4	14.0	14.0	7.7	X
Mid Door	22.5	X	4.3	7.0	9.7	9.9	10.1	11.3	11.3	12.0	12.4	12.9	13.4	14.0	7.6	6.1
Window Sill	33.9	1.2	1.6	4.5	6.3	7.7	8.4	9.6	9.8	10.6	10.6	11.5	11.8	11.7	7.5	1.5
Window Top	54.2	X	X	X	X	X	X	-0.1	0.4	-0.2	1.4	1.6	2.0	2.1	2.6	2.3

\*Projected impact point is 37 inches forward of driver's side wheelbase midpoint.

Column readings are front to rear from left to right.

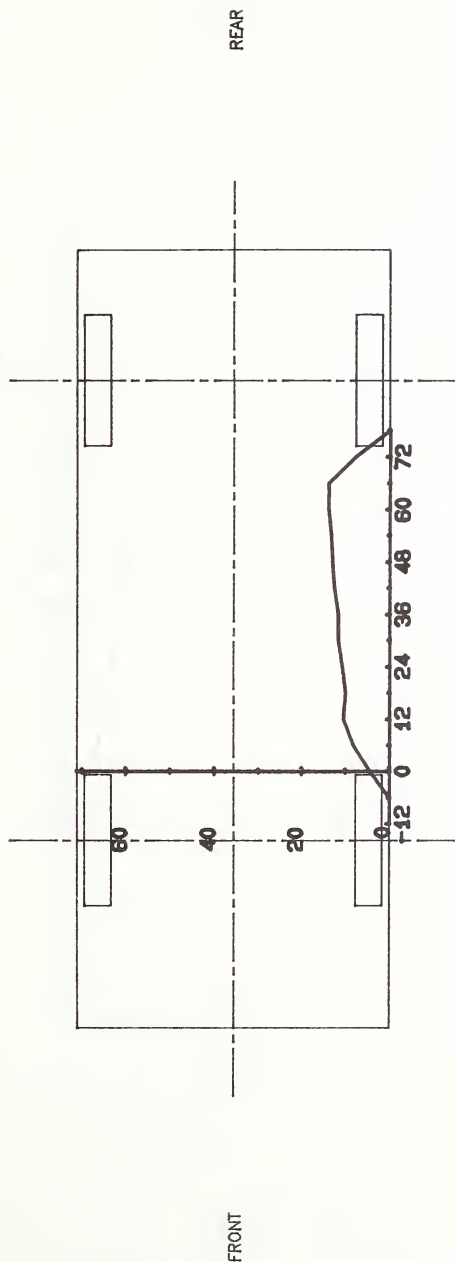
\*\*Reference plane is parallel to and 48 inches from the vehicle longitudinal centerline.

# VEHICLE EXTERIOR STATIC CRUSH PROFILE



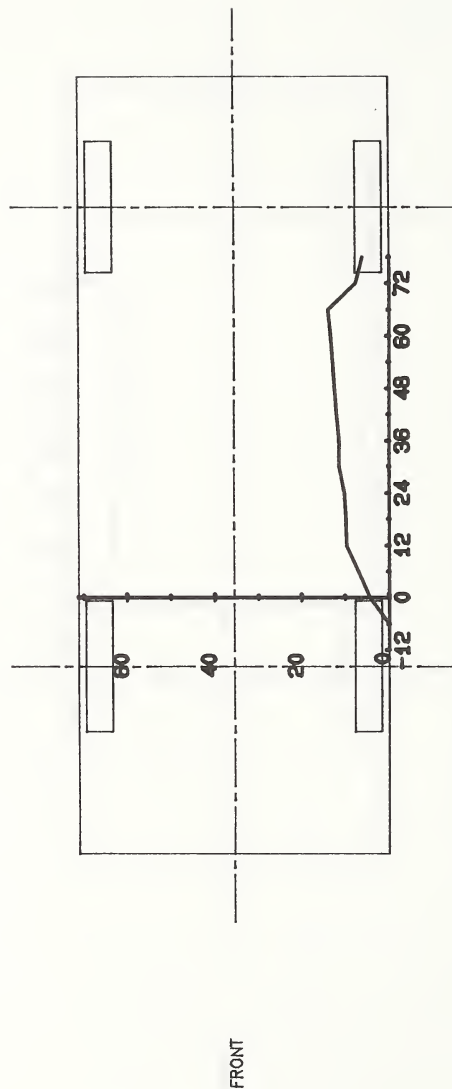
PROFILE LEVEL EQUALS AXLE HEIGHT WHICH IS 11.4" ABOVE GROUND LEVEL  
 (0,0) EQUALS PROJECTED IMPACT POINT  
 SCALE FACTOR EQUALS 0.032

# VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS H-POINT HEIGHT WHICH IS 21.2" ABOVE GROUND LEVEL  
 (0,0) EQUALS PROJECTED IMPACT POINT  
 SCALE FACTOR EQUALS 0.032

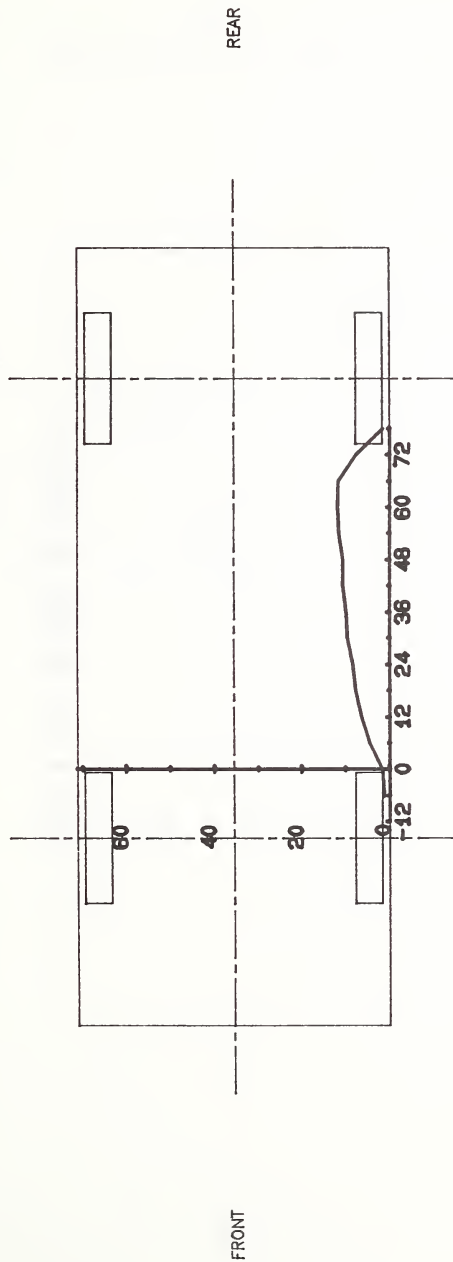
# VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS MID DOOR HEIGHT WHICH IS 22.5 " ABOVE GROUND LEVEL  
 (0,0) EQUALS PROJECTED IMPACT POINT  
 SCALE FACTOR EQUALS 0.032

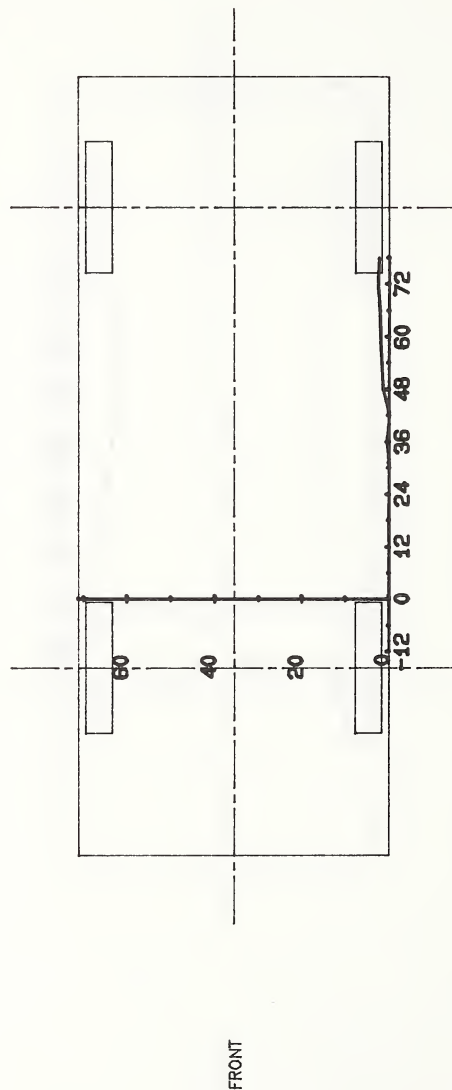


# VEHICLE EXTERIOR STATIC CRUSH PROFILE



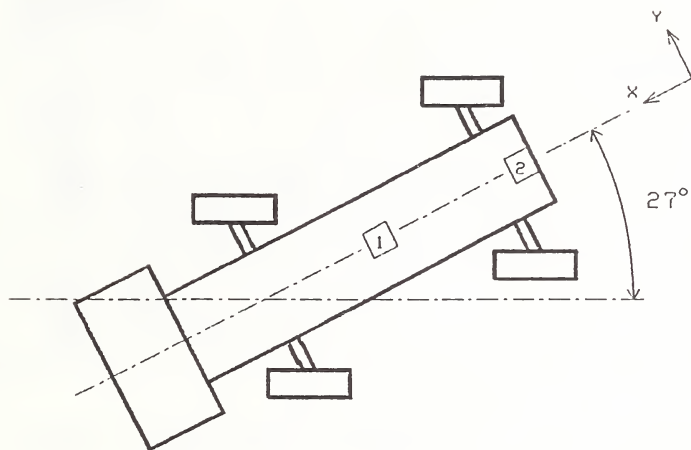
PROFILE LEVEL EQUALS WINDOW SILL HEIGHT WHICH IS 33.9" ABOVE GROUND LEVEL  
 (0,0) EQUALS PROJECTED IMPACT POINT  
 SCALE FACTOR EQUALS 0.032

# VEHICLE EXTERIOR STATIC CRUSH PROFILE



PROFILE LEVEL EQUALS WINDOW TOP HEIGHT WHICH IS 54.2" ABOVE GROUND LEVEL  
 (0,0) EQUALS PROJECTED IMPACT POINT  
 SCALE FACTOR EQUALS 0.032

MOVING BARRIER ACCELEROMETER PLACEMENT



# MOVING BARRIER ACCELEROMETER LOCATIONS AND DATA SUMMARY

TEST NUMBER 910520

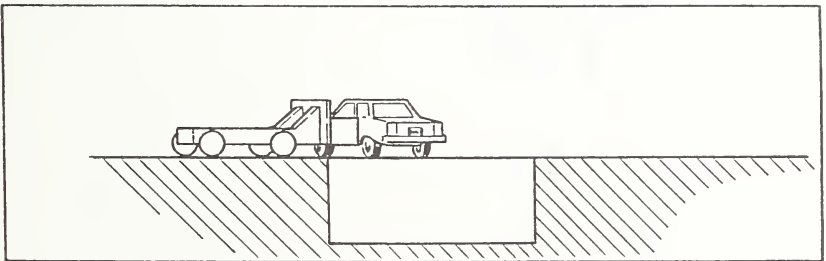
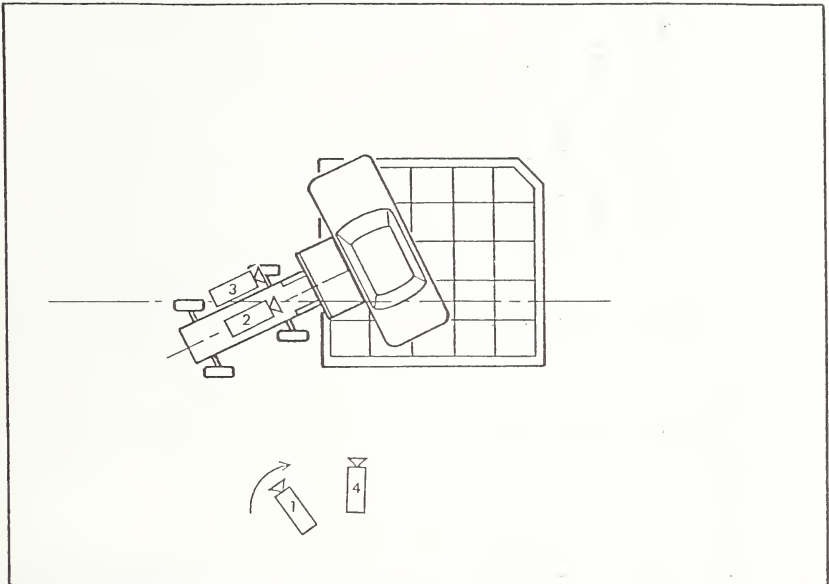
No.	LOCATION	X*	Y*	Z*	POSITIVE DIRECTION		NEGATIVE DIRECTION	
					MAX	G MSEC	MAX	G MSEC
1	CENTER OF GRAVITY	74.2	0.0	12.2				
	LONGITUDINAL				1.7	132.5	19.8	40.5
	LATERAL				2.6	114.6	7.8	19.8
	VERTICAL				6.1	32.4	4.4	22.8
	RESULTANT				20.4	40.4		
		Delta VX is -20.9 MPH @ 94.4 MSEC						
		Delta VY is -5.6 MPH @ 94.4 MSEC						
2	REAR FRAME MEMBER	0.0	0.0	24.0				
	LONGITUDINAL				2.9	121.0	20.1	32.9
	LATERAL				5.6	19.8	5.2	88.9
		Delta VX is -19.5 MPH @ 94.4 MSEC						
		Delta VY is 1.5 MPH @ 94.4 MSEC						

\* ALL MEASUREMENTS OF ACCELEROMETER LOCATIONS ARE IN INCHES.

REFERENCE: X: + FORWARD FROM REAR POINT OF FRAME  
Y: + RIGHTWARD FROM BARRIER CENTERLINE  
Z: + UPWARD FROM GROUND LEVEL

All measurements of accelerometer locations in inches.

CAMERA POSITIONS



## CAMERA INFORMATION

CAMERA NO.	LOCATION	TYPE	LENS (mm)	SPEED (fps)	PURPOSE OF CAMERA DATA
1	Right panning	Kodak	16	24	Real-time documentation
2	Onboard mov. bar. wide	Photosonic 1B	13	500	Impact point
3	Onboard mov. bar. tight	Photosonic 1B	25	498	Close-up of impact point
4	Right	Photosonic 1B	25	498	Overall view

APPENDIX A

PHOTOGRAPHS







Figure A-1. PRE-TEST VEHICLE FRONT AND BARRIER VIEW



Figure A-2. POST-TEST VEHICLE FRONT AND BARRIER VIEW

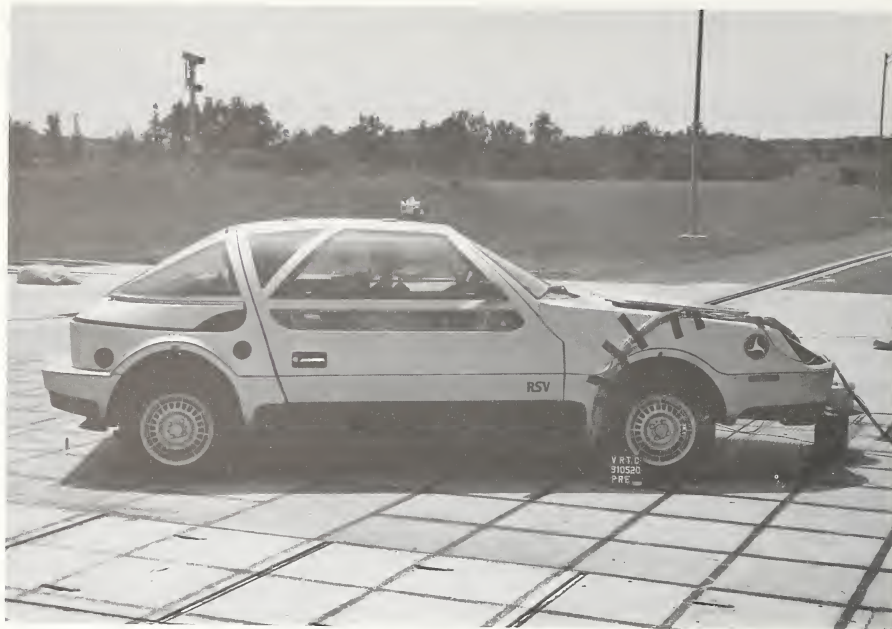


Figure A-3. PRE-TEST VEHICLE RIGHT SIDE VIEW

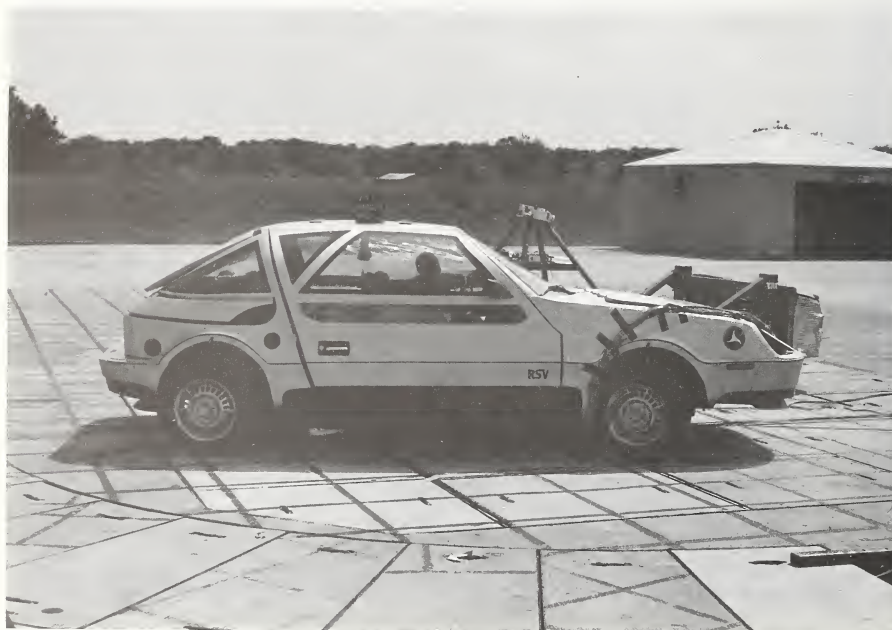


Figure A-4. POST-TEST VEHICLE RIGHT SIDE AND BARRIER VIEW



Figure A-5. PRE-TEST VEHICLE REAR AND BARRIER VIEW



Figure A-6. POST-TEST VEHICLE REAR AND BARRIER VIEW





Figure A-7. PRE-TEST VEHICLE LEFT SIDE AND BARRIER VIEW



Figure A-8. POST-TEST VEHICLE LEFT SIDE AND BARRIER VIEW



Figure A-9. PRE-TEST VEHICLE LEFT SIDE VIEW



Figure A-10. POST-TEST VEHICLE LEFT SIDE VIEW



Figure A-11. POST-TEST VEHICLE LEFT SIDE CLOSE-UP VIEW



Figure A-12. PRE-TEST VEHICLE RIGHT FRONT VIEW





Figure A-13. POST-TEST VEHICLE RIGHT FRONT VIEW



Figure A-14. PRE-TEST VEHICLE LEFT REAR VIEW



Figure A-15. PRE-TEST VEHICLE LEFT REAR CLOSE-UP VIEW



Figure A-16. POST-TEST VEHICLE LEFT FRONT AND BARRIER VIEW



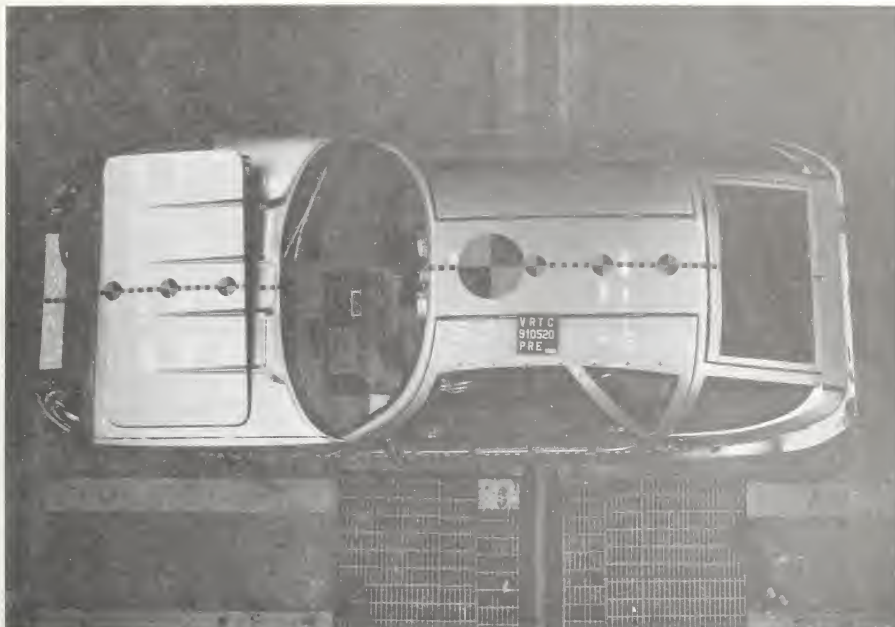


Figure A-17. PRE-TEST VEHICLE TOP - VIEW 1

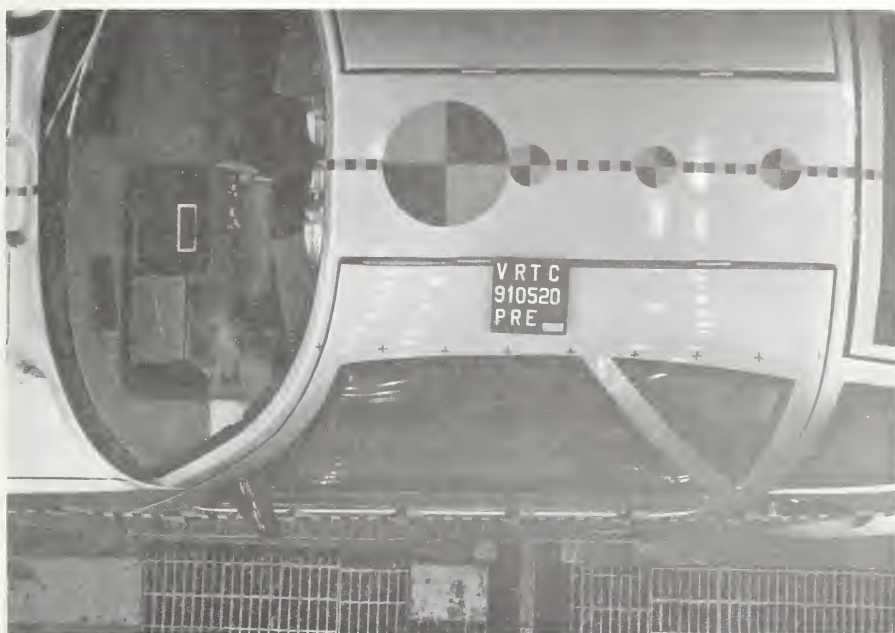


Figure A-18. PRE-TEST VEHICLE TOP - VIEW 2

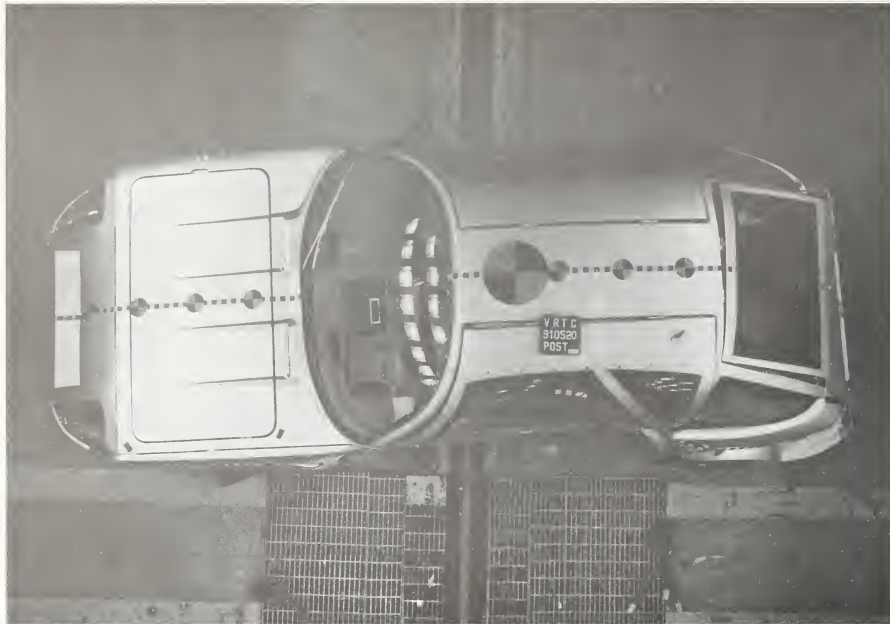


Figure A-19. POST-TEST VEHICLE TOP - VIEW 1

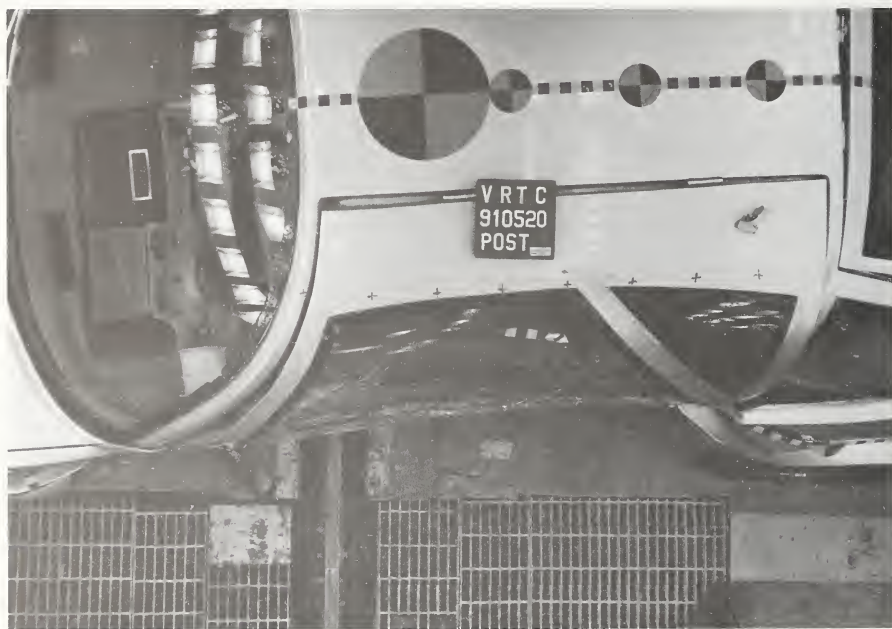


Figure A-20. POST-TEST VEHICLE TOP - VIEW 2



Figure A-21. PRE-TEST DRIVER AND PASSENGER DUMMIES LEFT SIDE VIEW



Figure A-22. POST-TEST DRIVER AND PASSENGER DUMMIES RIGHT SIDE VIEW





Figure A-23. PRE-TEST DRIVER DUMMY - VIEW 1



Figure A-24. PRE-TEST DRIVER DUMMY - VIEW 2



Figure A-25. PRE-TEST DRIVER DUMMY - VIEW 3



Figure A-26. PRE-TEST PASSENGER DUMMY - VIEW 1



Figure A-27. PRE-TEST PASSENGER DUMMY - VIEW 2



Figure A-28. PRE-TEST PASSENGER DUMMY - VIEW 3



Figure A-29. POST-TEST PASSENGER DUMMY - VIEW 1



Figure A-30. POST-TEST PASSENGER DUMMY - VIEW 2





Figure A-31. POST-TEST DRIVER DUMMY CONTACT - VIEW 1



Figure A-32. POST-TEST DRIVER DUMMY CONTACT - VIEW 2





Figure A-33. POST-TEST DRIVER DUMMY CONTACT - VIEW 3



Figure A-34. POST-TEST PASSENGER DUMMY CONTACT - VIEW 1

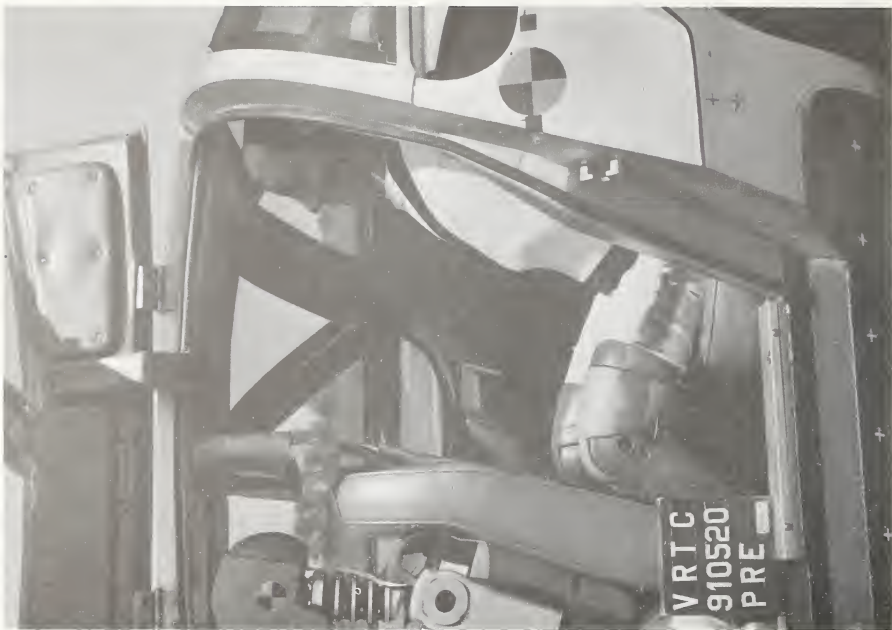


Figure A-35. POST-TEST PASSENGER DUMMY CONTACT - VIEW 2



Figure A-36. POST-TEST BARRIER FACE - VIEW 1



Figure A-37. POST-TEST BARRIER FACE - VIEW 2



## APPENDIX B

### DATA PLOT PRESENTATION

Data plots generated from the crash test data are presented on the following pages. All data are recorded on magnetic tape for inclusion in the NHTSA crash test data base system. All data were filtered according to SAE J211 OCT88 except that dummy thorax and pelvis data were filtered using the HSRI filter.



WRTC .910520

LEFT SIDE IMPACT

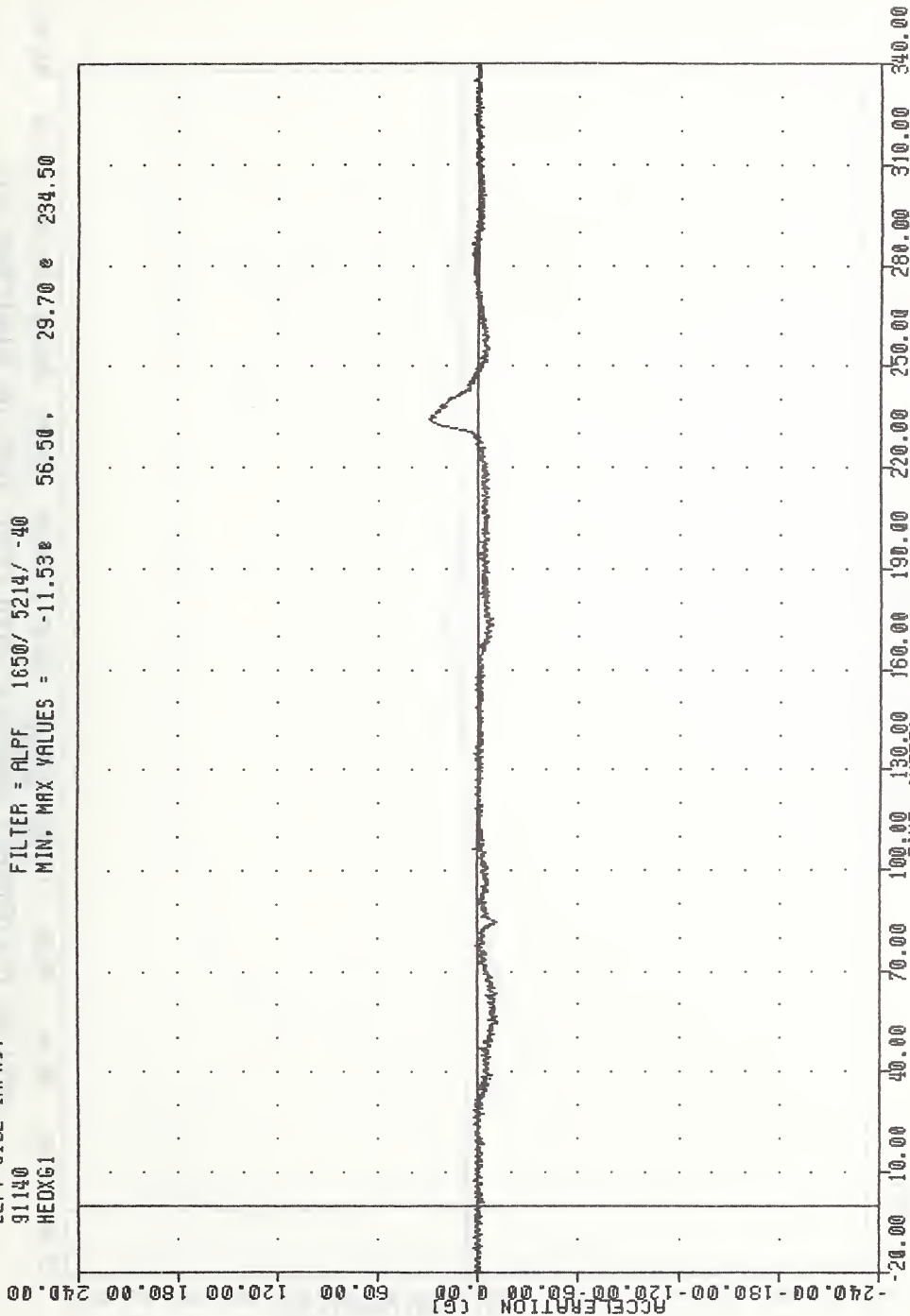
91140

HEDXG1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -11.53e

56.50 , 29.70 e 234.50



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER HEAD X-AXIS ACCELERATION



VRTC , 910520

LEFT SIDE IMPACT

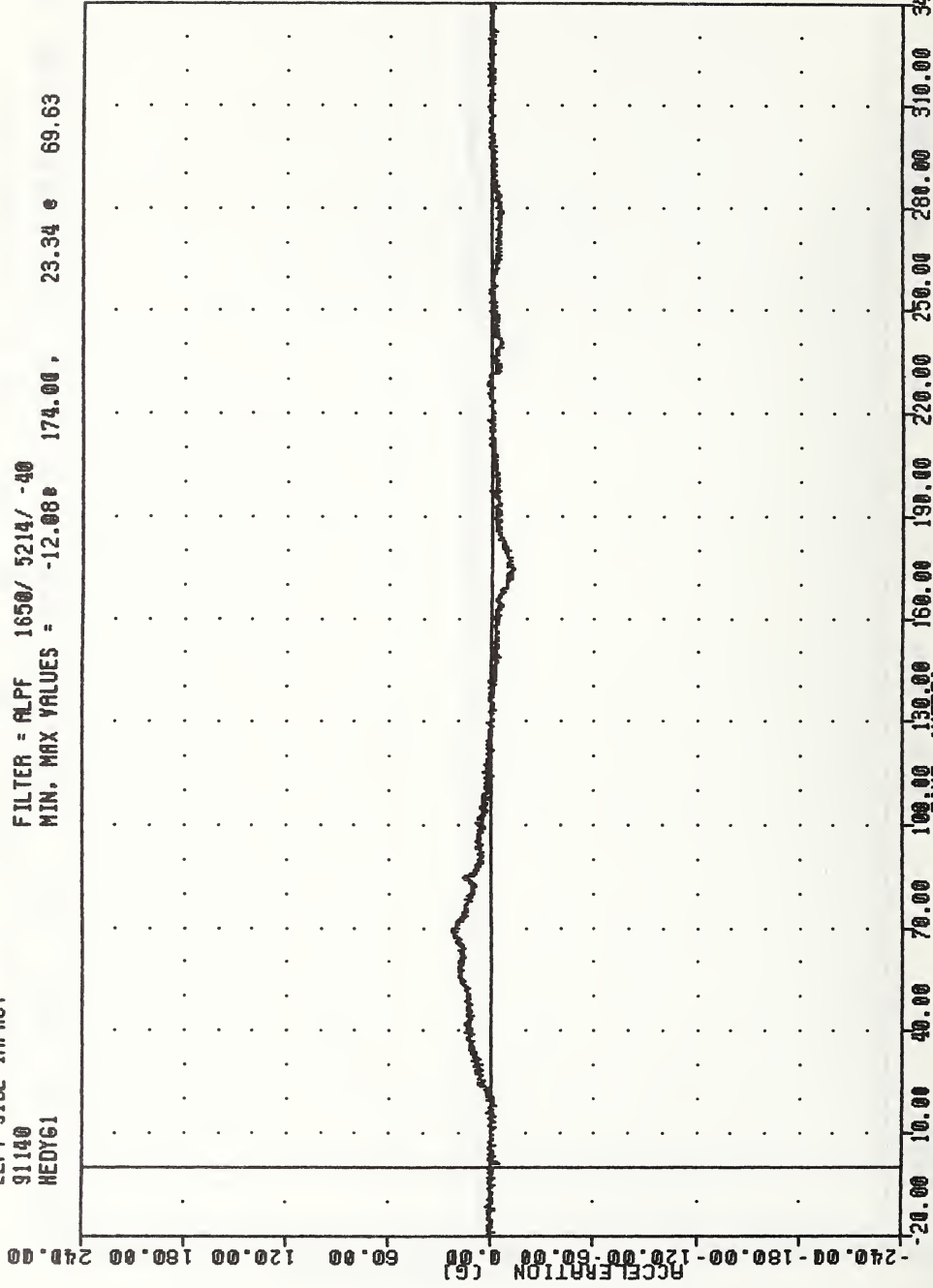
91140

HEDY61

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -12.08 174.00 ,

23.34 e 69.63



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER HEAD Y-AXIS ACCELERATION



VRTC , 910520

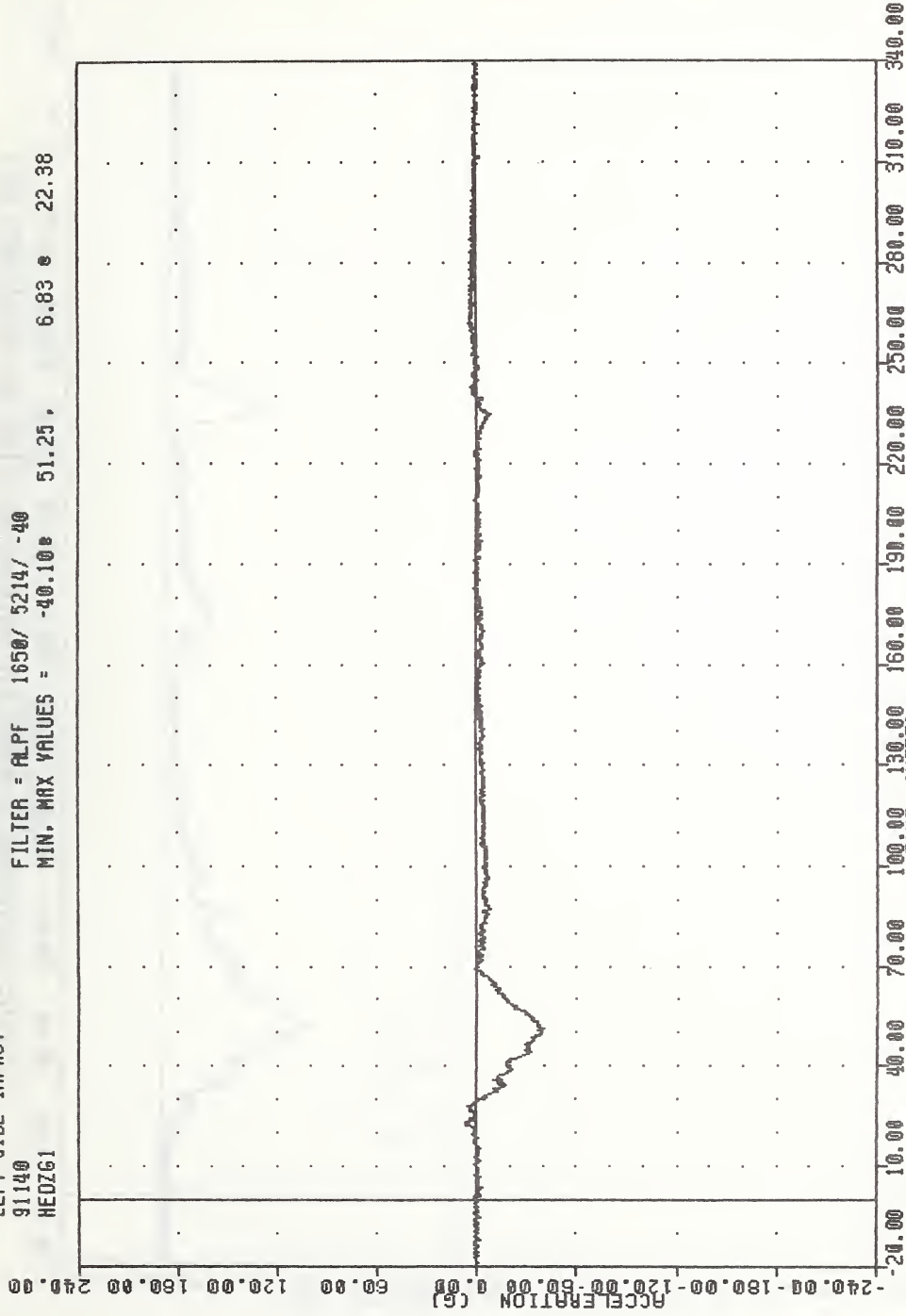
LEFT SIDE IMPACT

91140

HE0261

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -40.10 51.25, 6.83 22.38

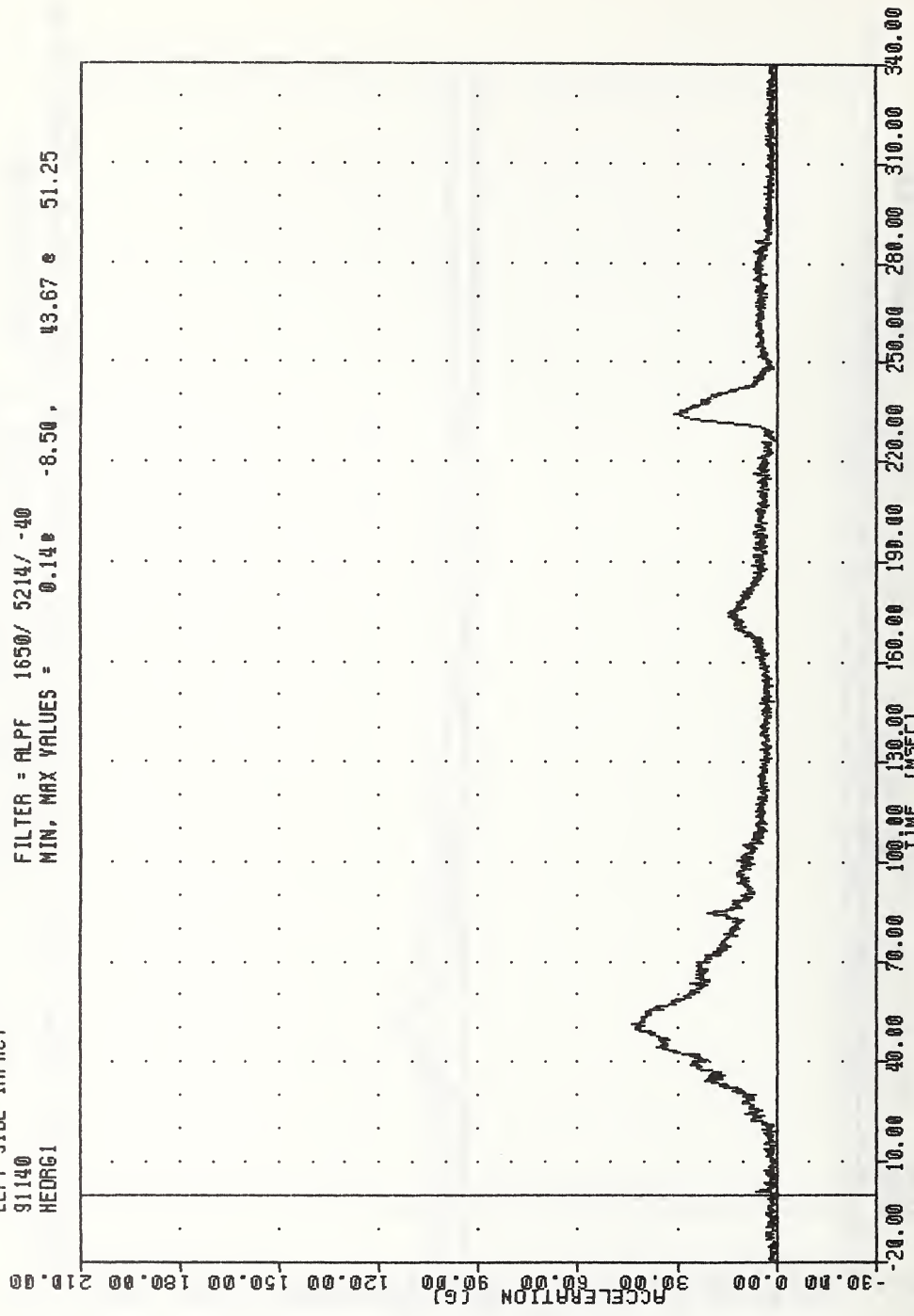


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER HEAD Z-AXIS ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
HEDRG1

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.148 -8.50 ,

43.67 s 51.25



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER HEAD RESULTANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

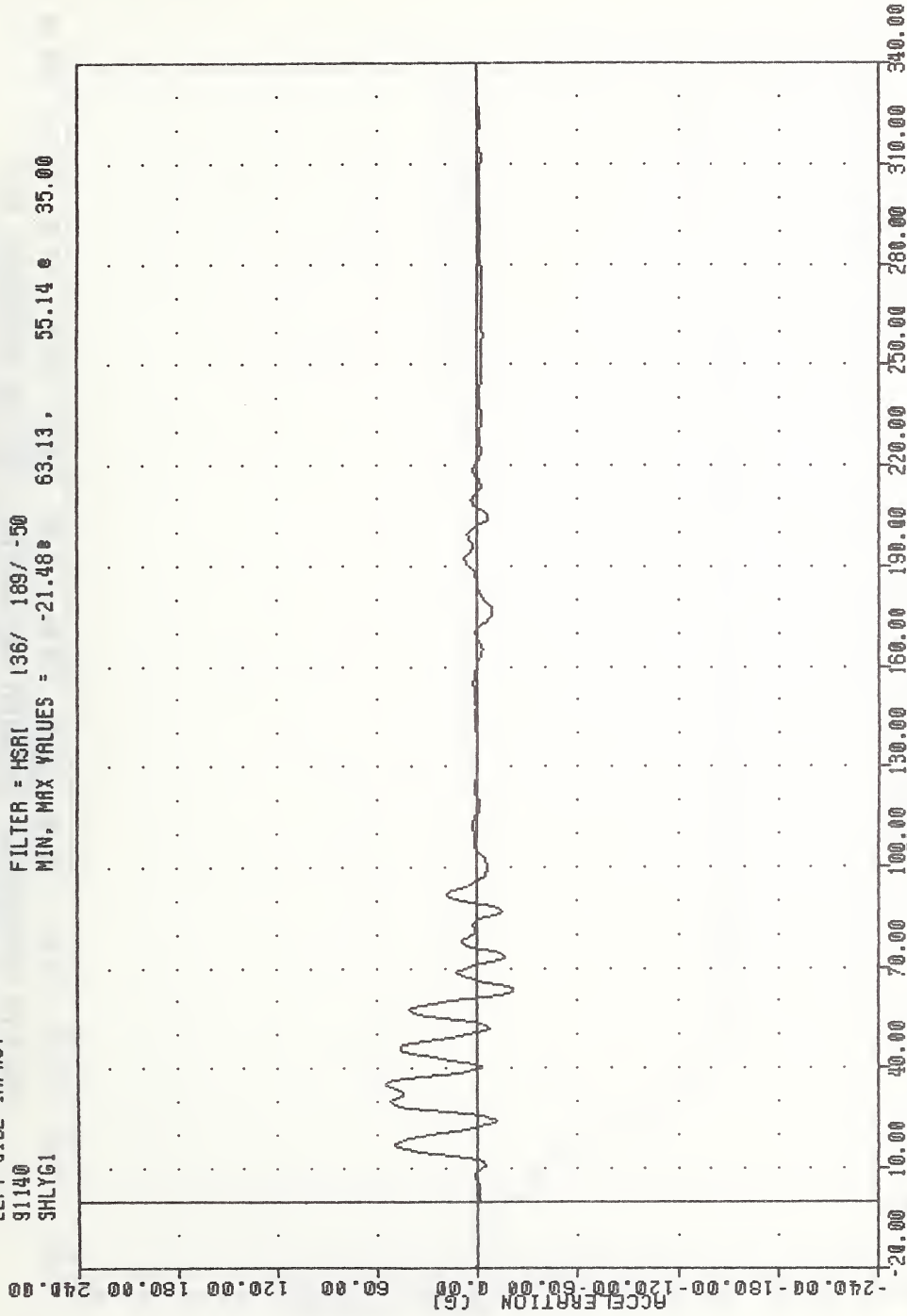
91140

SHLYG1

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = -21.48 63.13,

55.14 e 35.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT SHOULDER Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

SHLYV1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.15e

12.25,

26.70 e

61.13

40.00

30.00

20.00

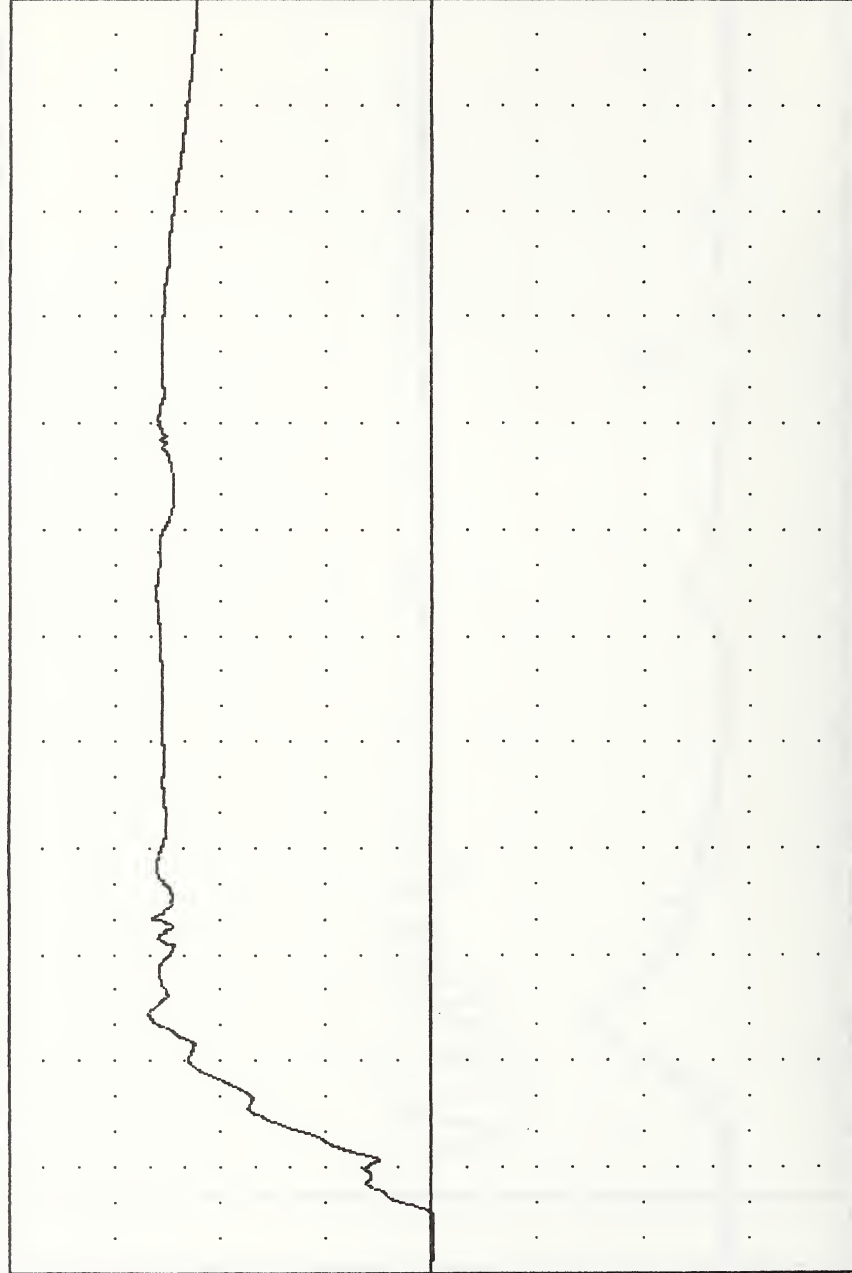
10.00

0.00

-10.00

-20.00

-30.00



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

TIME (msec)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

DRIVER LEFT SHOULDER Y-AXIS VELOCITY

VRTC , 910520

LEFT SIDE IMPACT

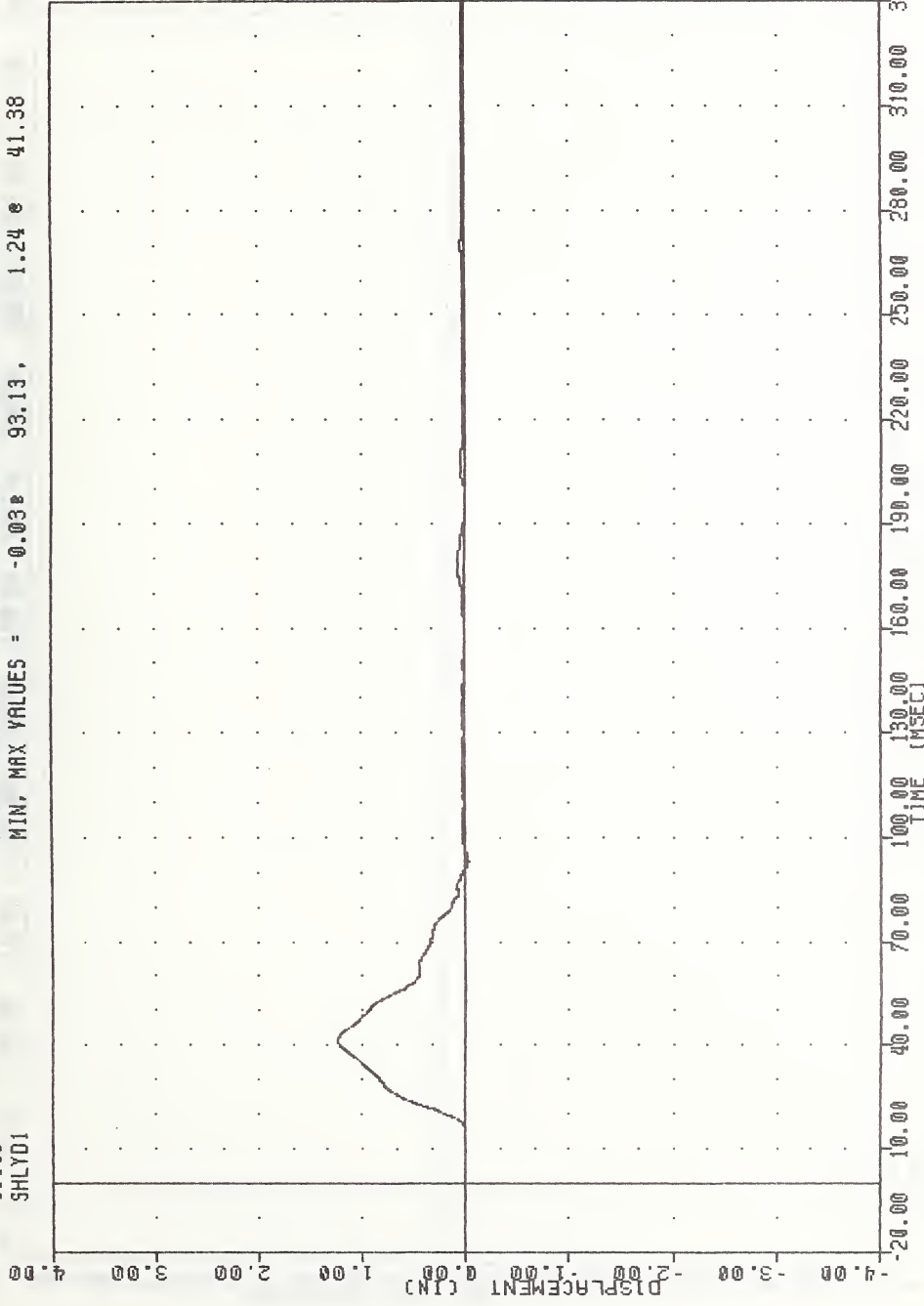
91140

SHLYD1

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.03 1.24

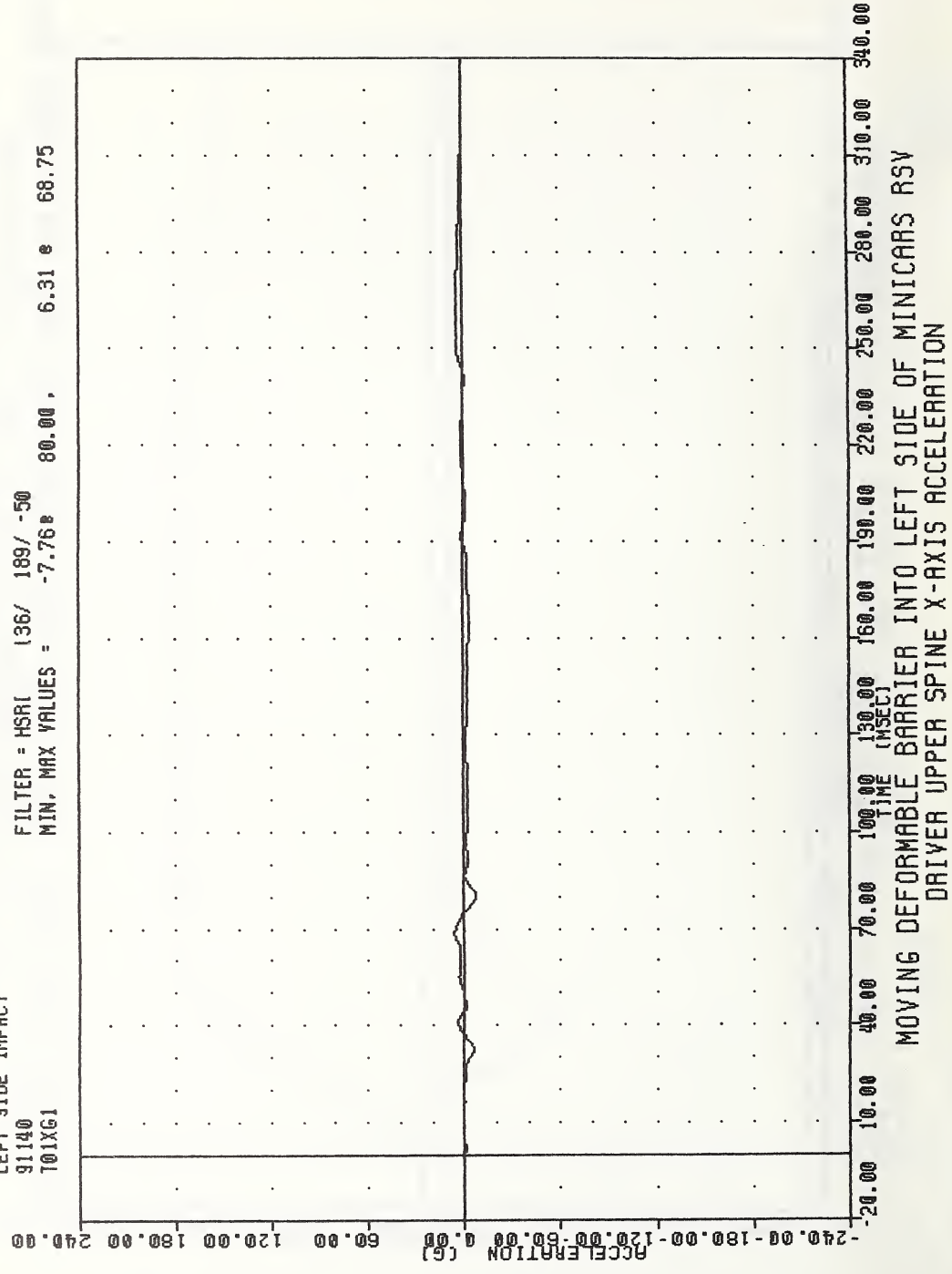
93.13, 41.38



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT SHOULDER TO SPINE DISPLACEMENT

VRTC , 910520  
 LEFT SIDE IMPACT  
 91140  
 701XG1

FILTER = HSAI 136/ 189/ -50  
 MIN. MAX VALUES = -7.76 80.00 , 6.31 68.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
 DRIVER UPPER SPINE X-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

T01Y61

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES =

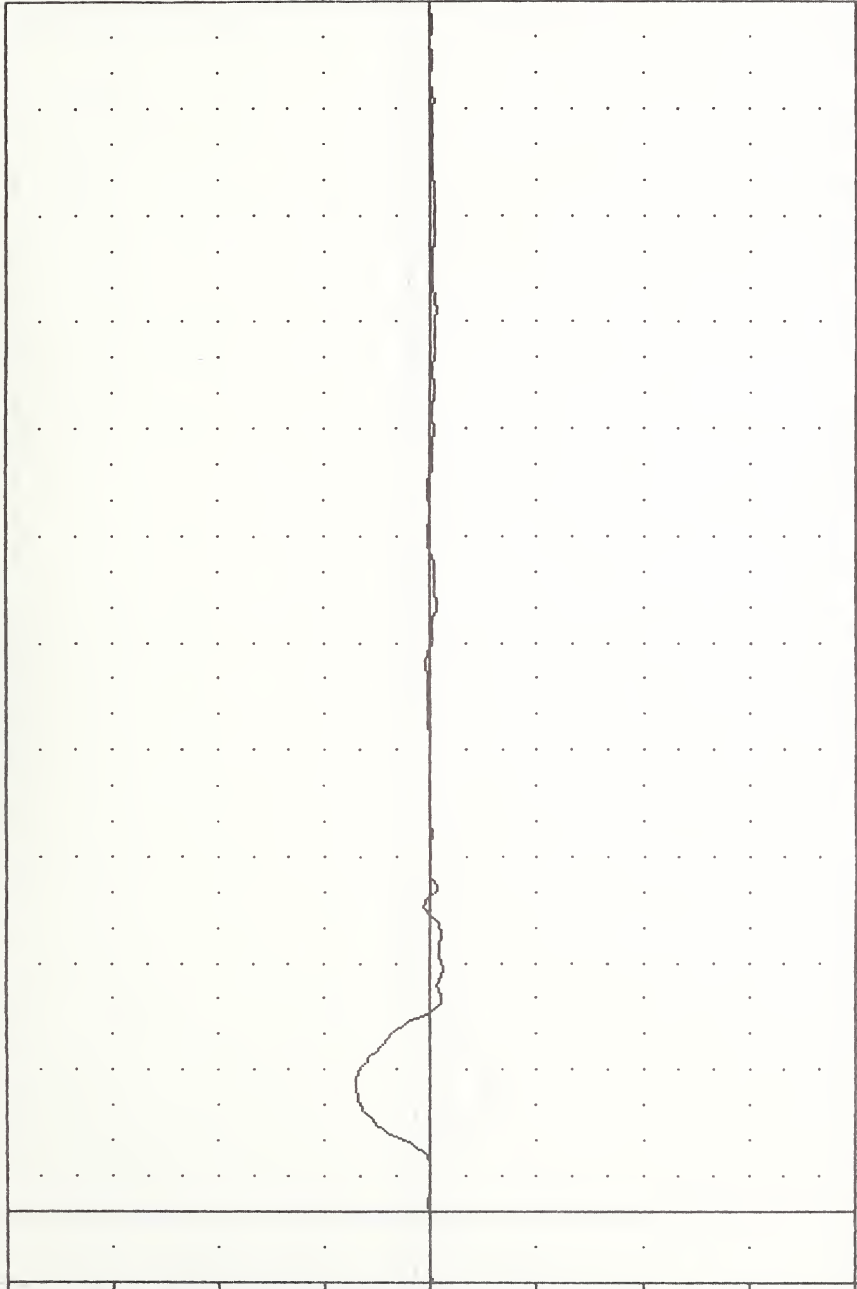
-7.33

68.75 ,

42.72

36.25

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

T01Y6A

FILTER = HSAI 136/ 189/ -50

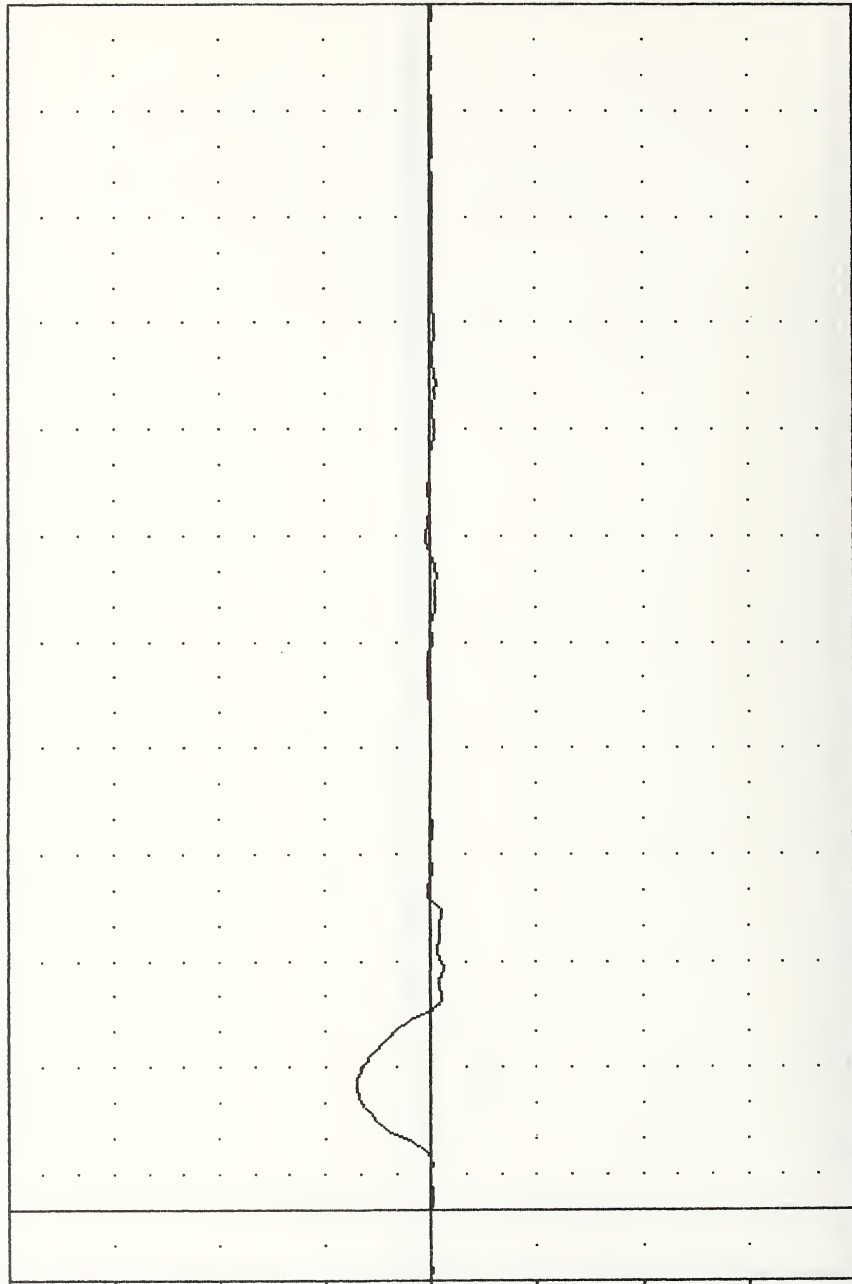
MIN. MAX VALUES =

68.13,

42.33 @

35.63

ACCELERATION (G)



Time (msec)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE Y-AXIS REDUNDANT ACCELERATION



VRTC , 910520

LEFT SIDE IMPACT

91140

T01ZG1

FILTER = HSRI 136/ 189/ -50

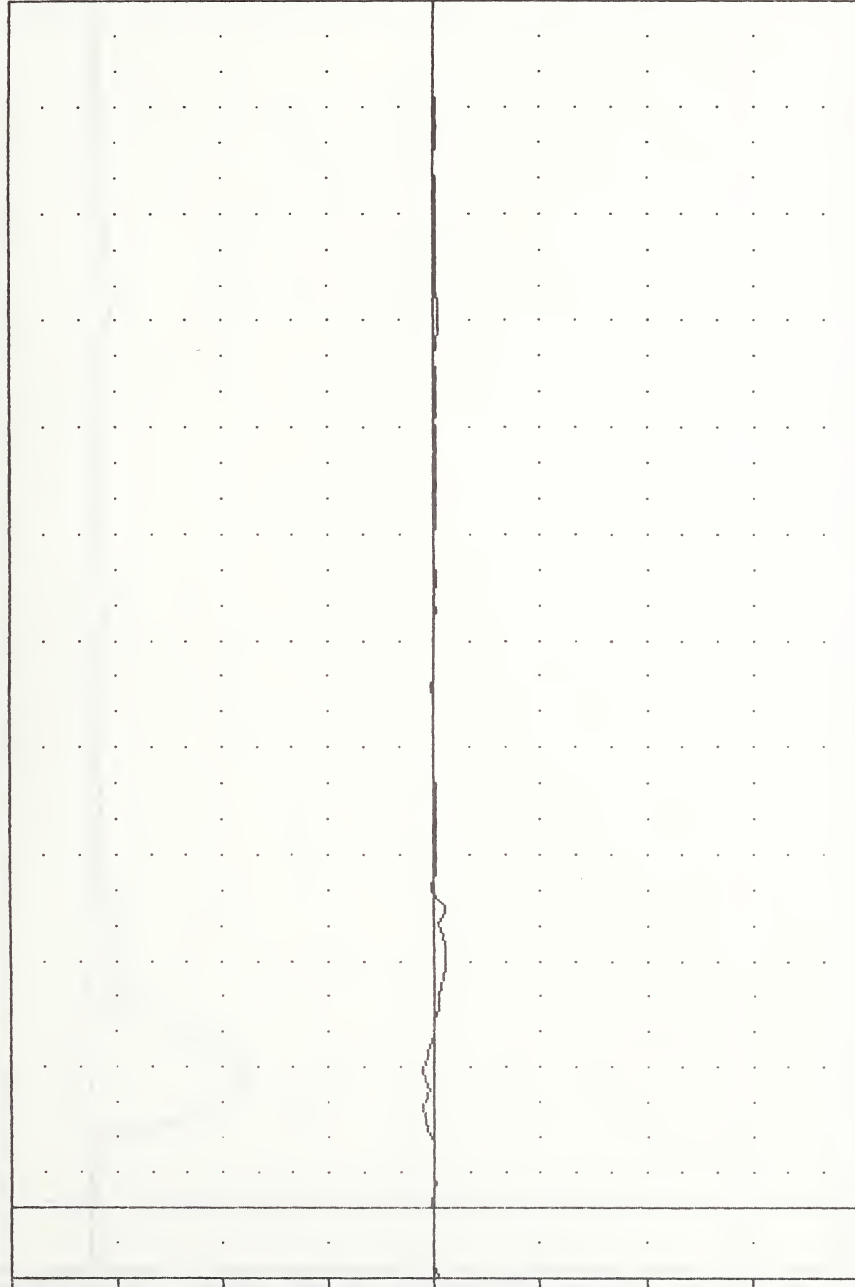
MIN, MAX VALUES = -6.31e

69.38 ,

6.42 e

38.75

ACCELERATION (G)



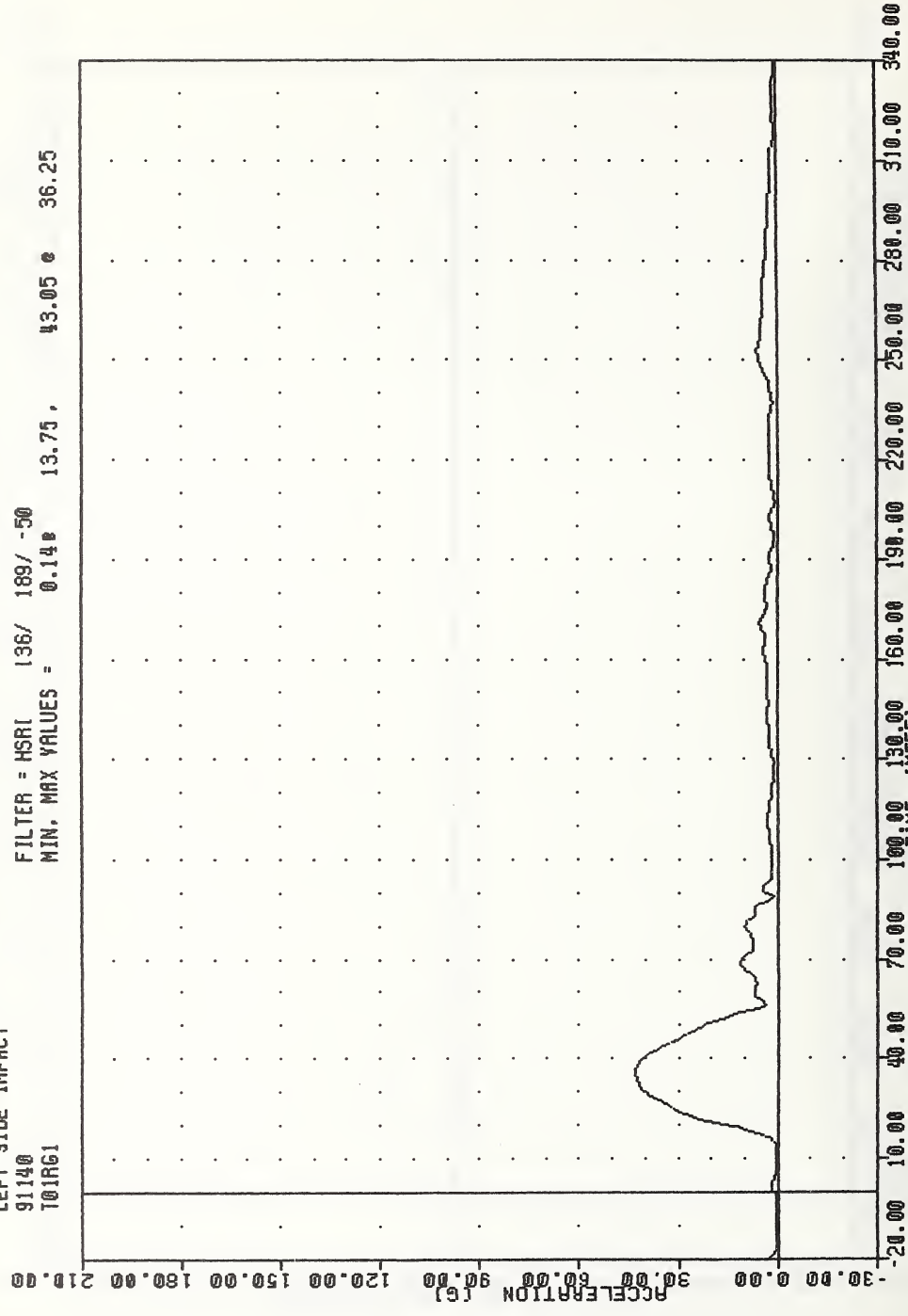
-240.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE Z-AXIS ACCELERATION

UNIT: g

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
T01RG1

FILTER = HSRI 136/ 189/ -50  
MIN. MAX VALUES = 0.148 13.75, 43.05 e 36.25



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE RESULTANT ACCELERATION

VRTC # 910520

LEFT SIDE IMPACT

91140

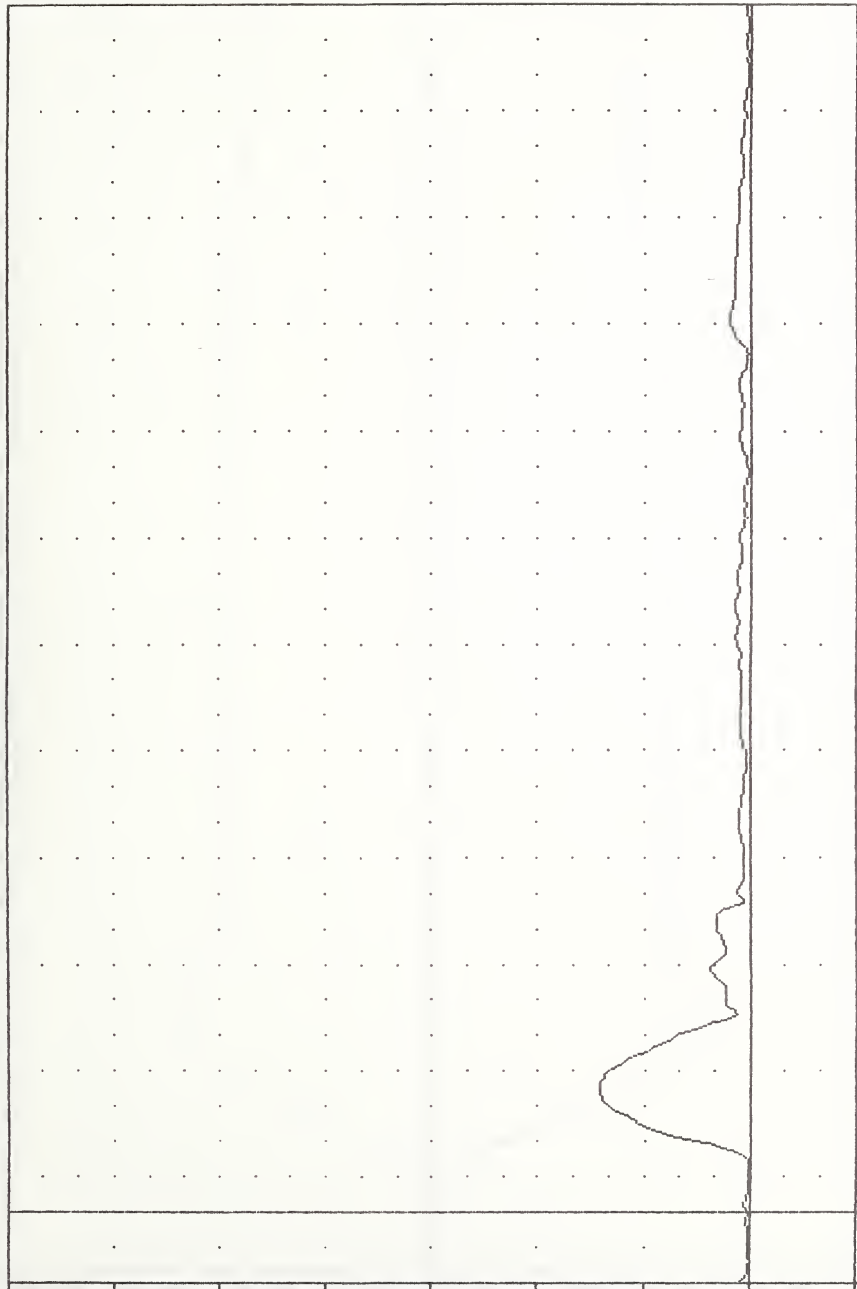
T01RGA

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = 0.08 -13.75,

42.64 e 35.63

ACCELERATION (G)



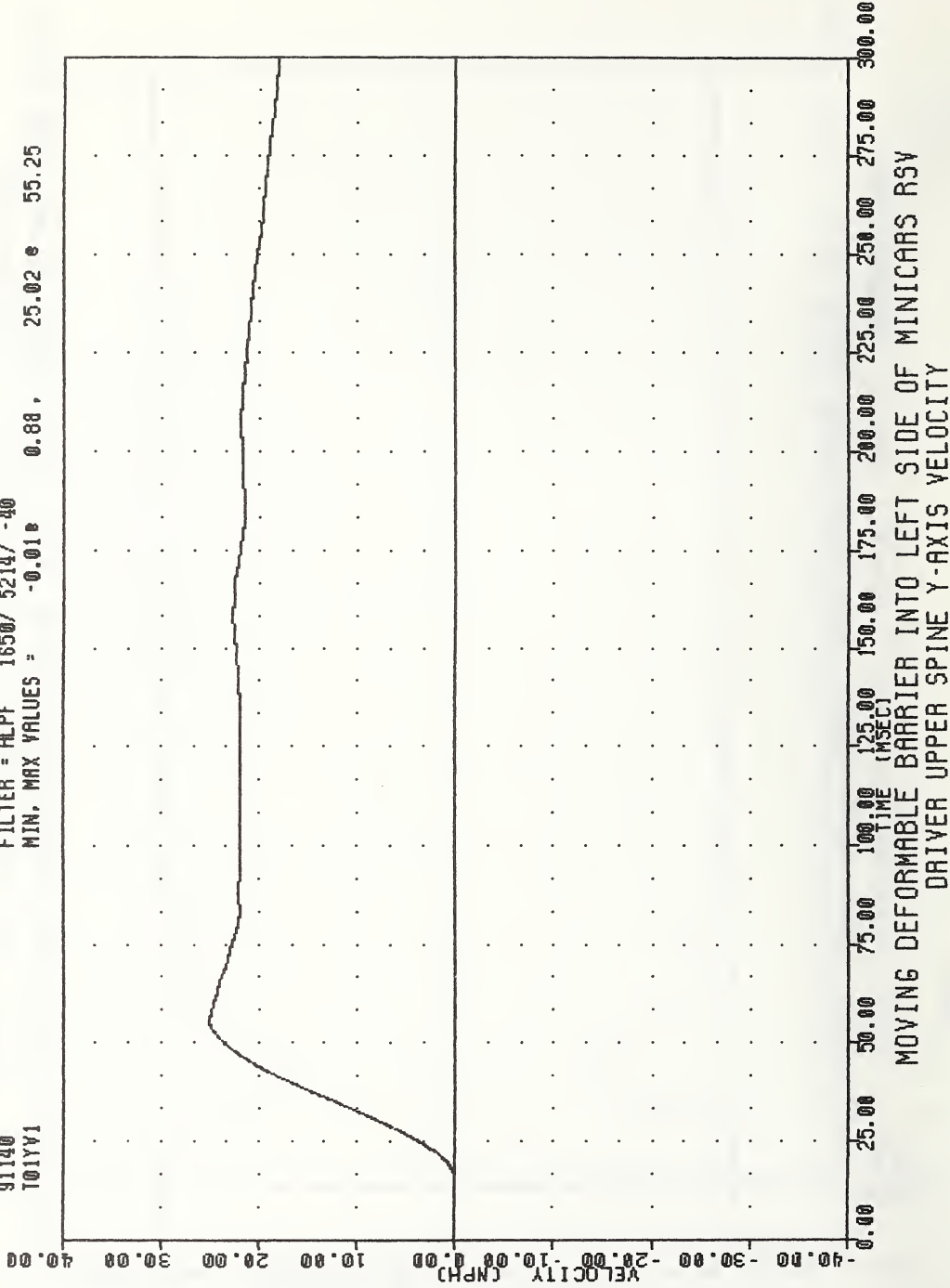
-20.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE REDUNDANT RESULTANT ACCELERATION

VRTC  
LEFT SIDE IMPACT  
91140  
1011V1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.01e 0.88, 25.02 e 55.25



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER UPPER SPINE Y-AXIS VELOCITY

VRTC , 910520

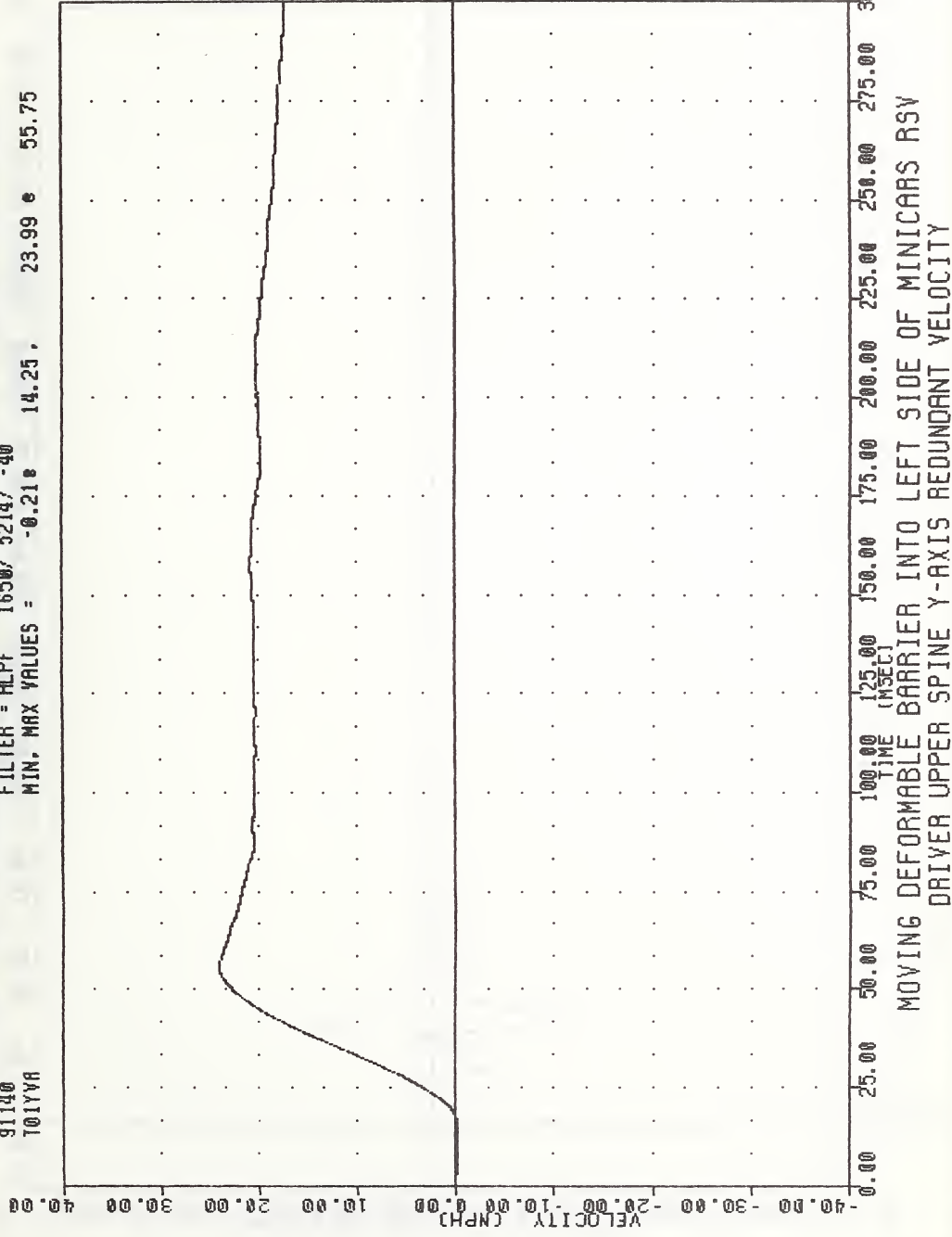
LEFT SIDE IMPACT

91140

701YVA

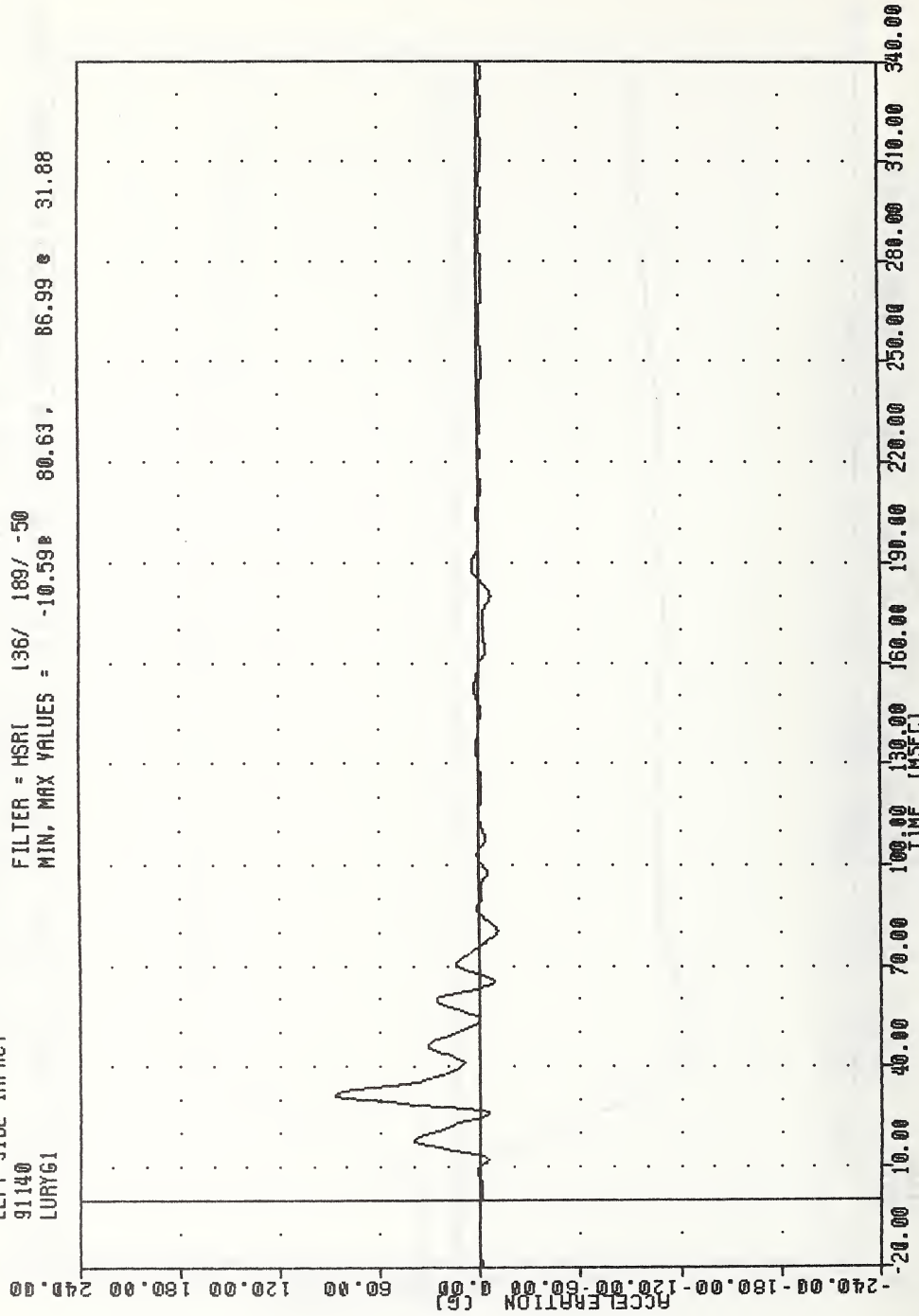
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.218 14.25 , 23.99 e 55.75



VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LURY61

FILTER = HSR( 136/ 189/ -50  
MIN, MAX VALUES = -10.59 80.63 , 86.99 31.88



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER THORAX RIB Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

LURY68

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES =

-9.94

80.00

89.14

31.25

240.00

180.00

120.00

60.00

0.00

-60.00

-120.00

-180.00

-240.00

ACCELERATION (G)

TIME (MSEC)

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

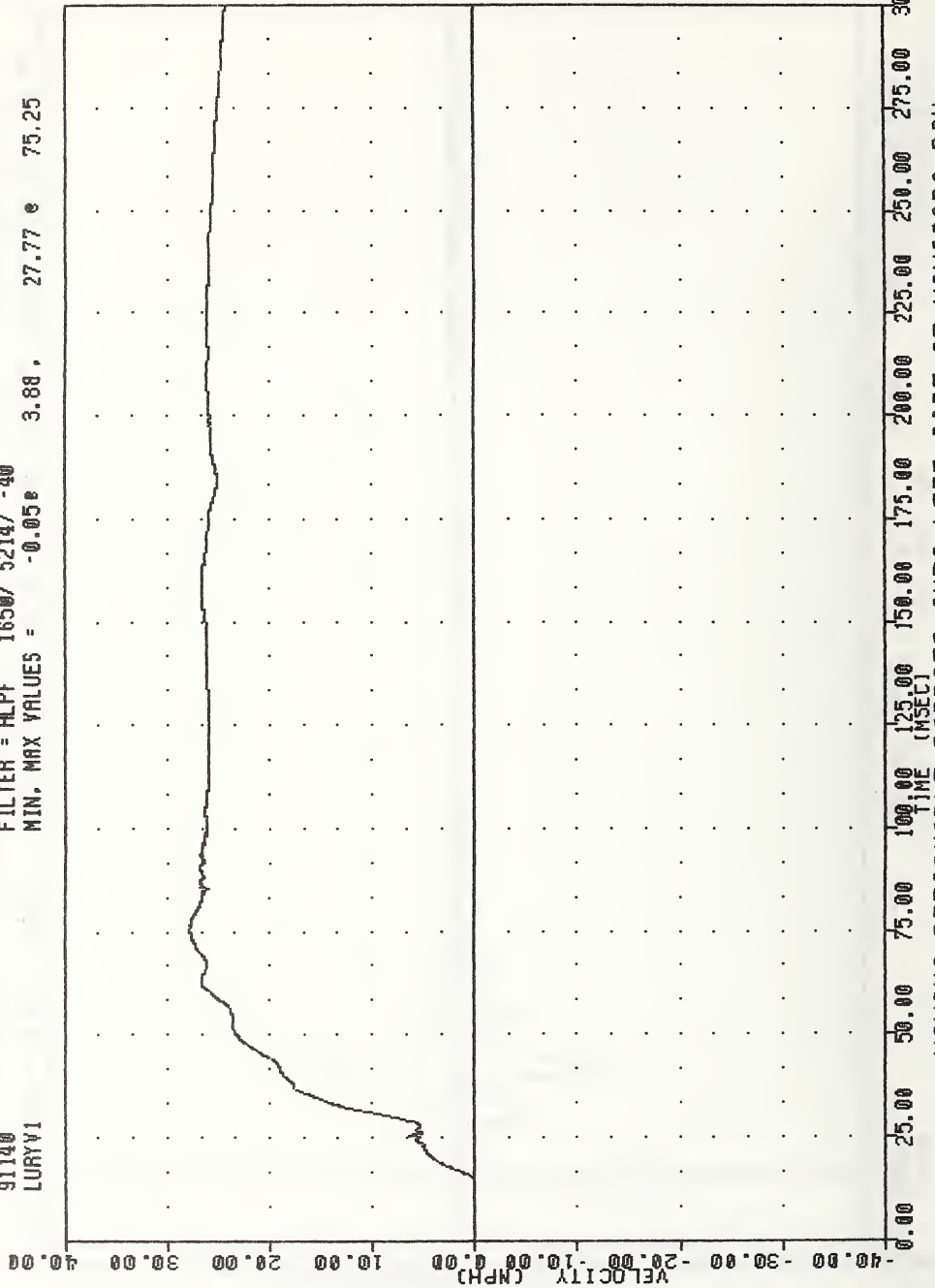
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT ACCELERATION



VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LURV1

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -0.05 3.88

27.77 75.25



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER THORAX AIB Y-AXIS VELOCITY

VRTC , 910520

LEFT SIDE IMPACT

91140

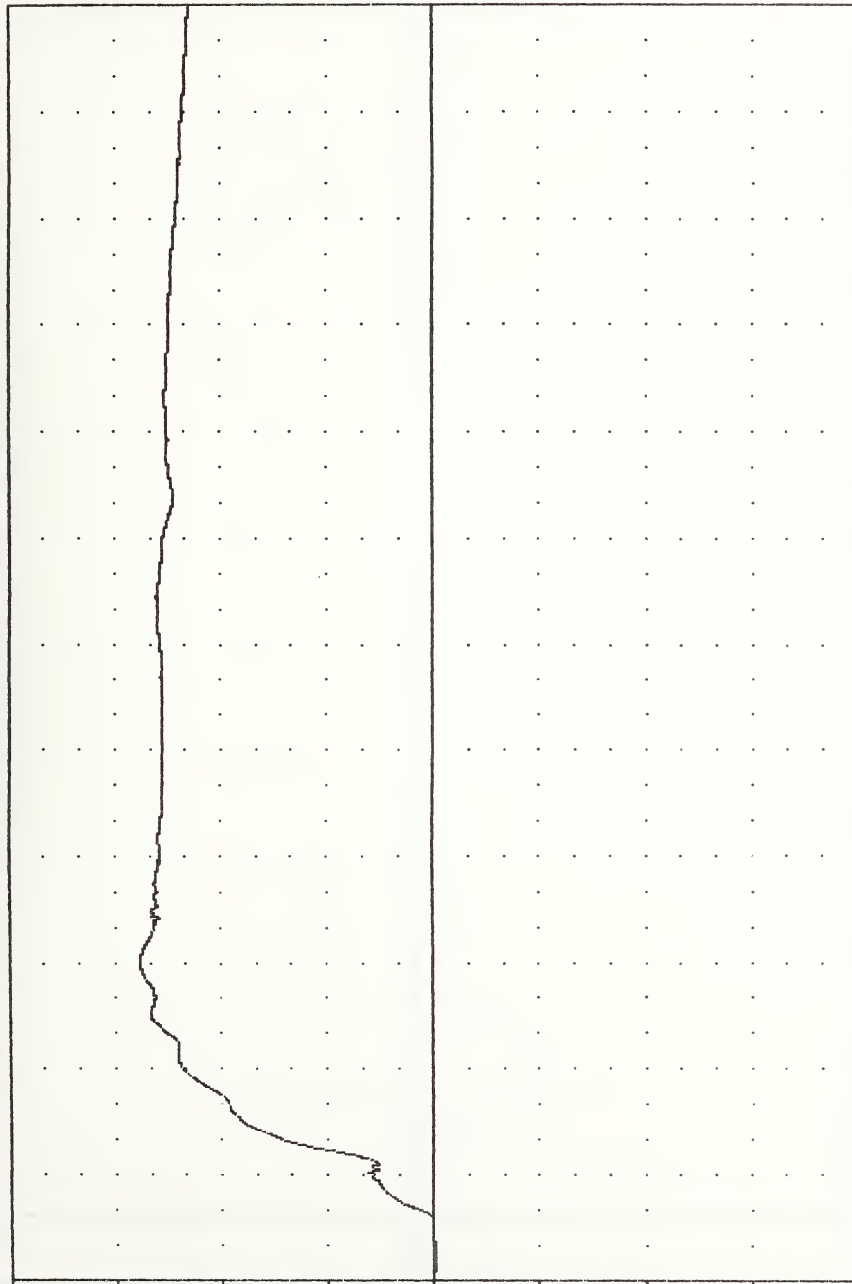
LURYVA

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.098

5.75, 27.66 e 75.13

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00  
VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00  
TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT VELOCITY

NRIC , 910520

LEFT SIDE IMPACT

91140

LURYD1

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.018 155.13 ,

1.23 e 42.75

4.00

3.00

2.00

1.00

0.00

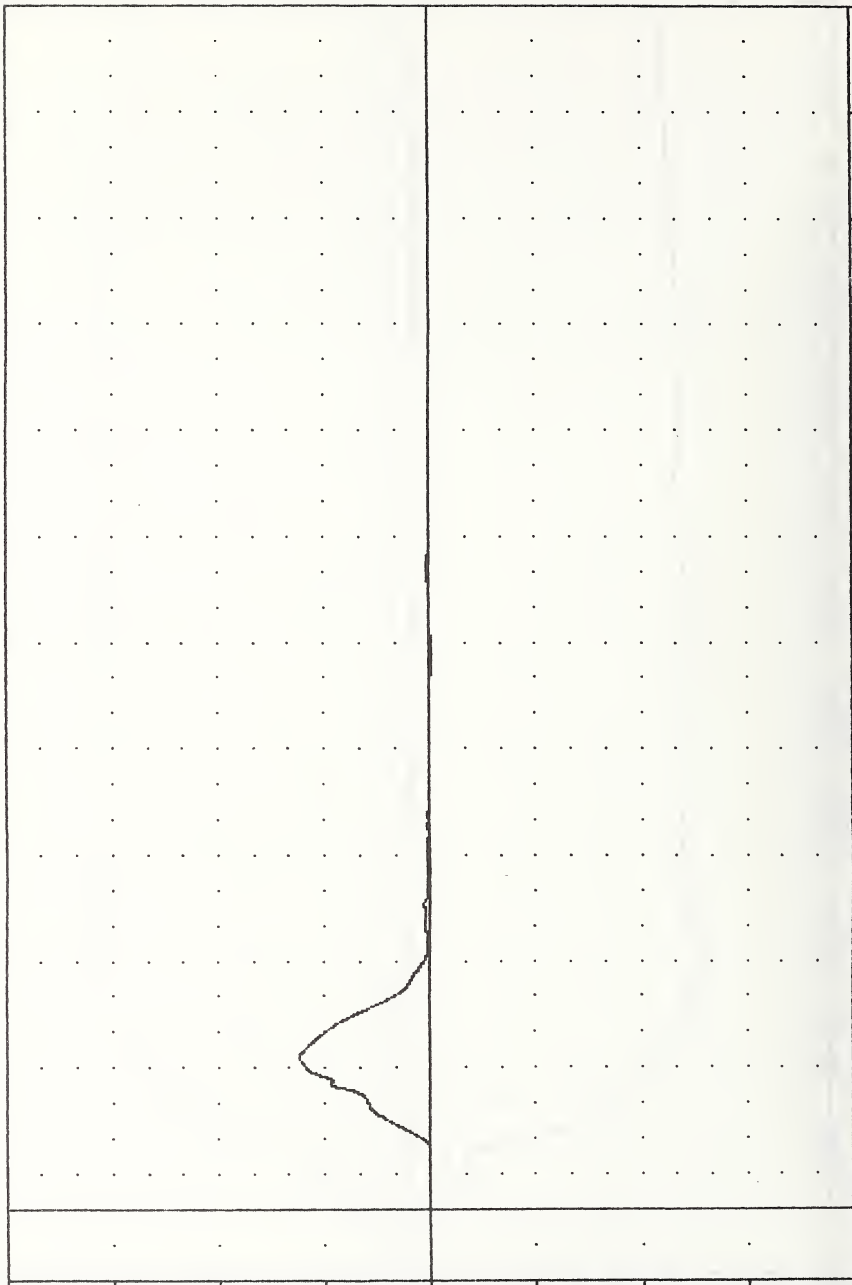
-1.00

-2.00

-3.00

-4.00

DISPLACEMENT (IN)



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

DRIVER LEFT UPPER THORAX AIB DISPLACEMENT

NRIC , 910520

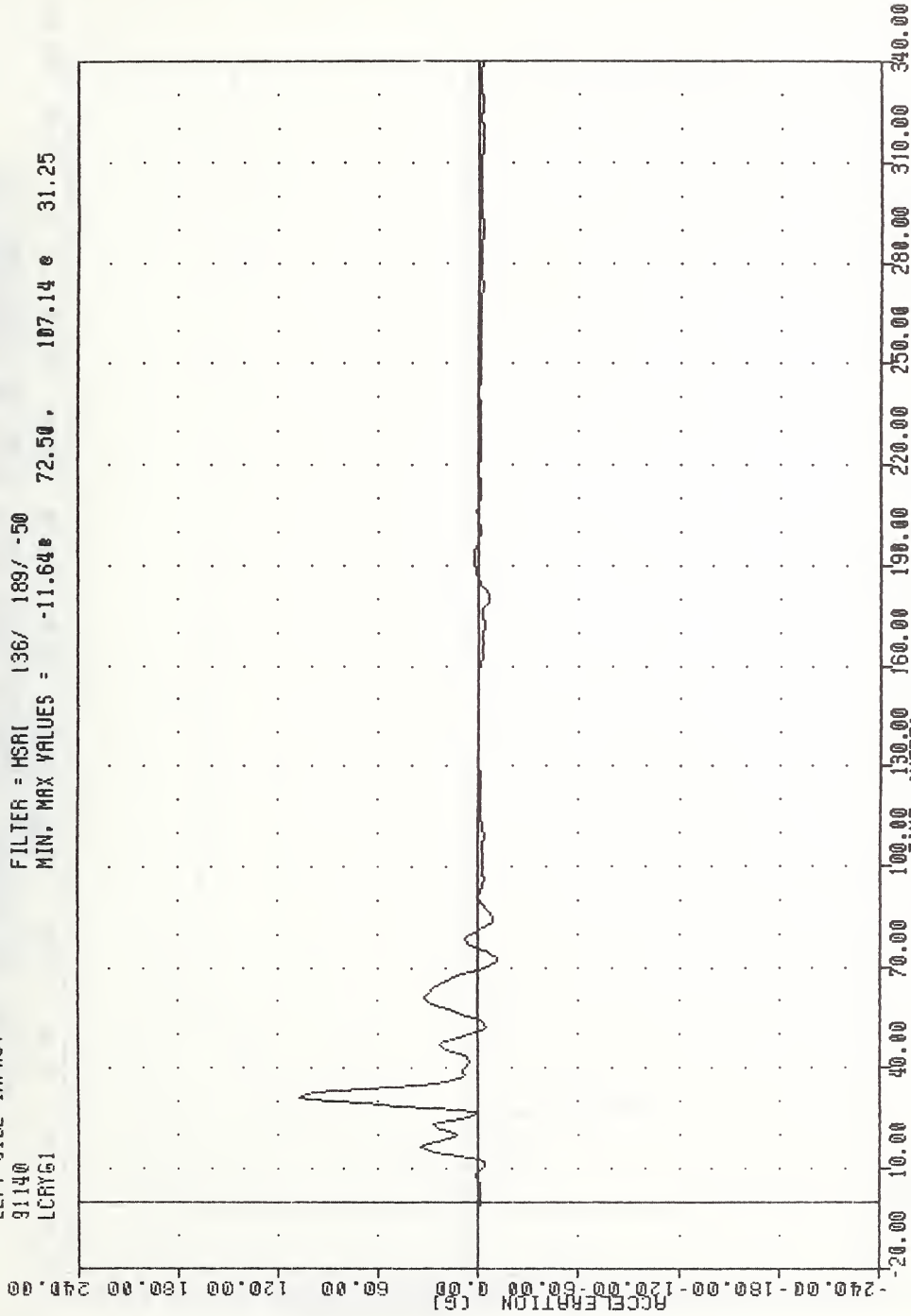
LEFT SIDE IMPACT

91140

LCRYG1

FILTER = HSAI 136/ 189/ -50

MIN. MAX VALUES = -11.64 72.50 , 107.14 0 31.25



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT CENTER THORAX RIB Y-AXIS ACCELERATION

VRIC , 910520

LEFT SIDE IMPACT

91140

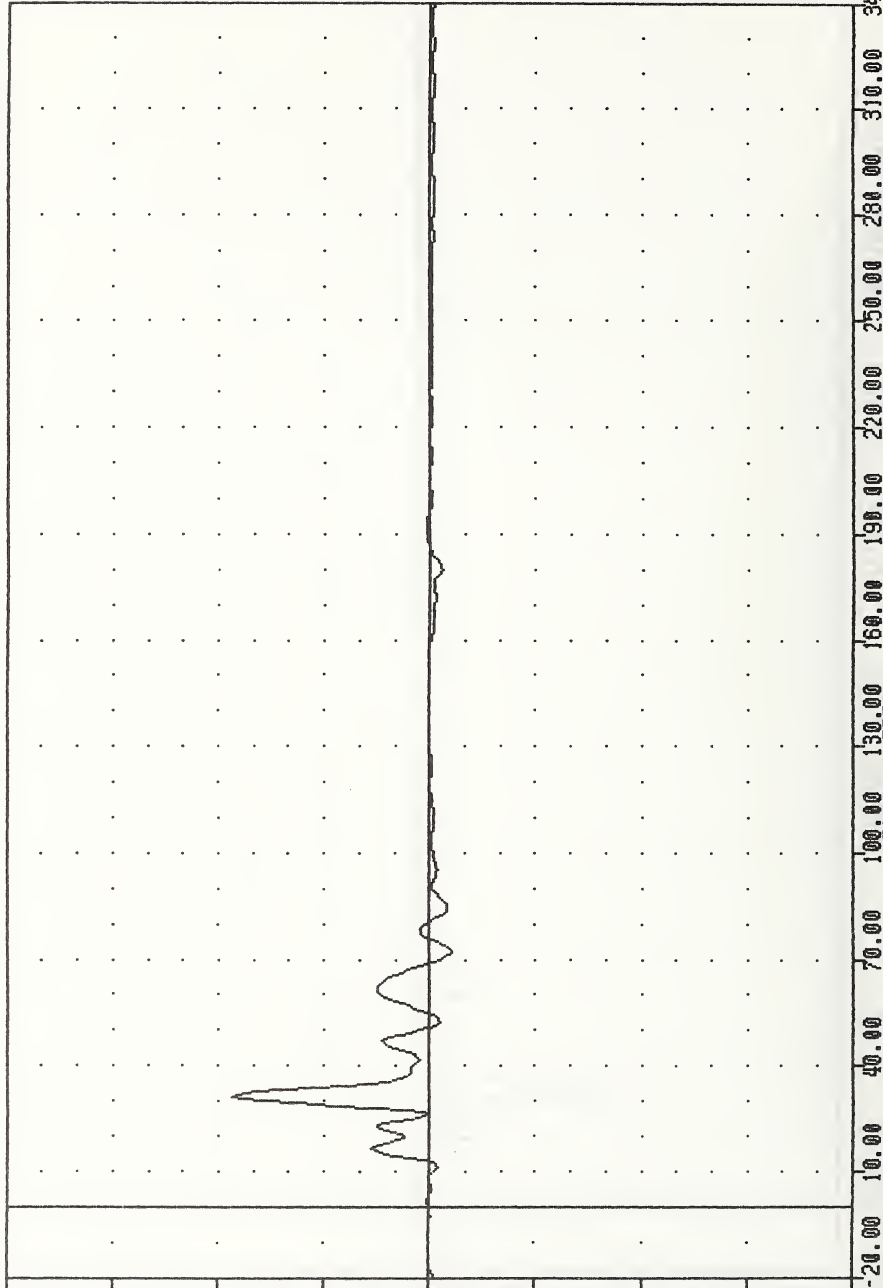
LCRYGA

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -12.32 72.50

111.78 31.25

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT CENTER THORAX RIB Y-AXIS REDUNDANT ACCELERATION

VRTC . 910520

LEFT SIDE IMPACT

91140

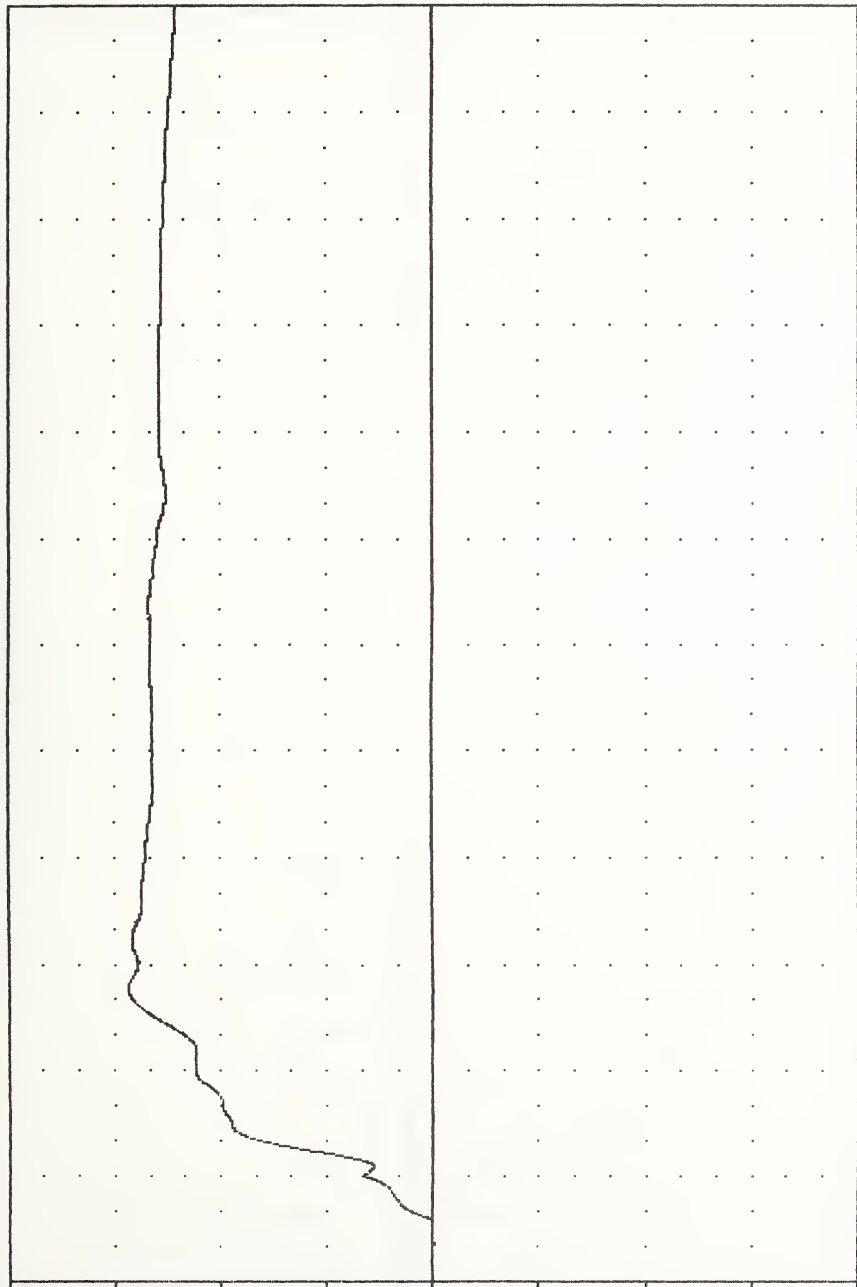
LCRYV1

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.09 8.88

28.71 69.13

VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT CENTER THORAX RIB Y-AXIS VELOCITY

VRTC 910520

LEFT SIDE IMPACT

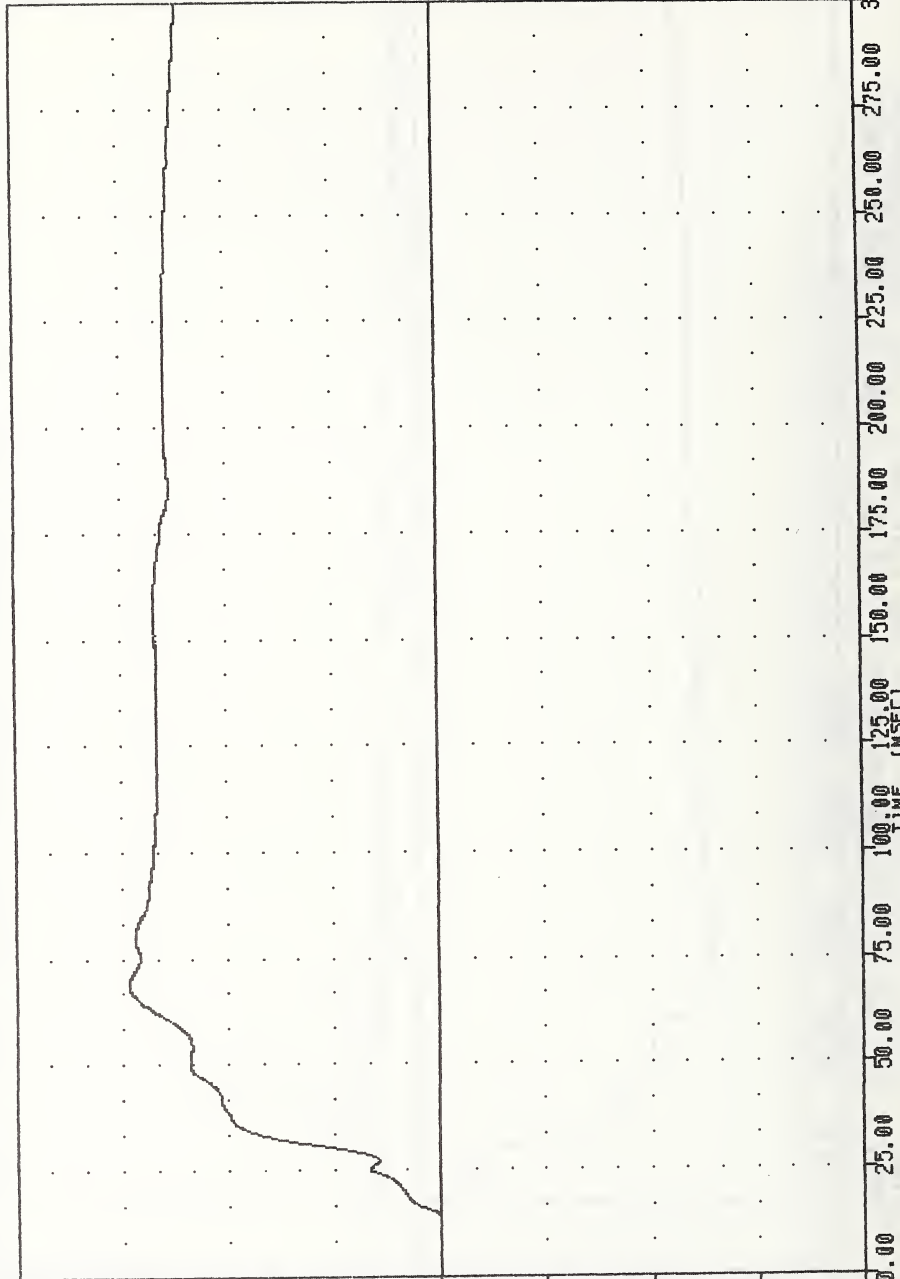
91140

LCRYVA

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 0.00 0.50 29.40 e 68.88

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00  
VELOCITY (MPH)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT CENTER THORAX RIB Y-AXIS REDUNDANT VELOCITY



VRTC , 910520

LEFT SIDE IMPACT

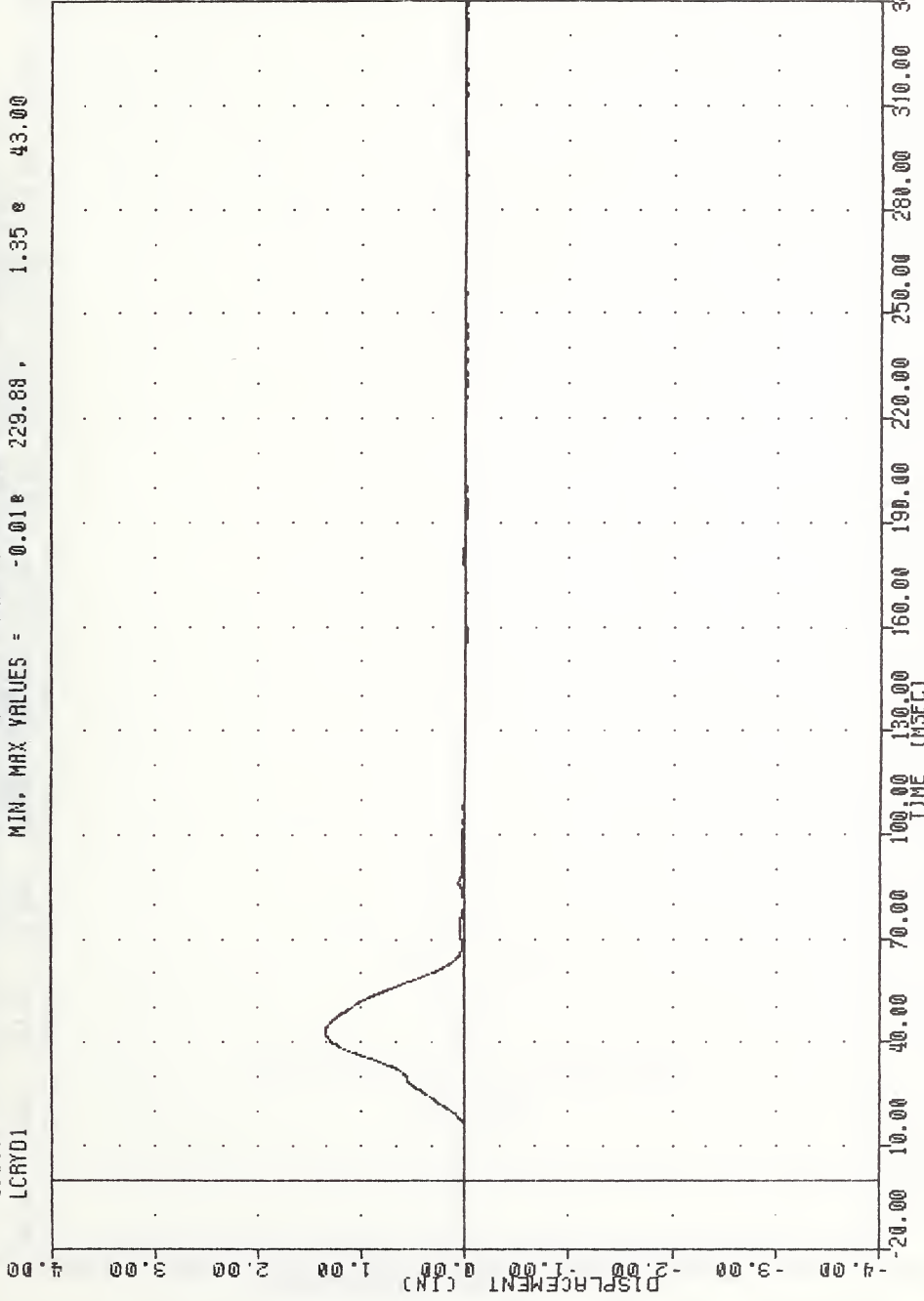
91140

LCRY01

FILTER = BLFF 300/ 949/ -40

MIN. MAX VALUES = -0.018 229.88 ,

1.35 e 43.00

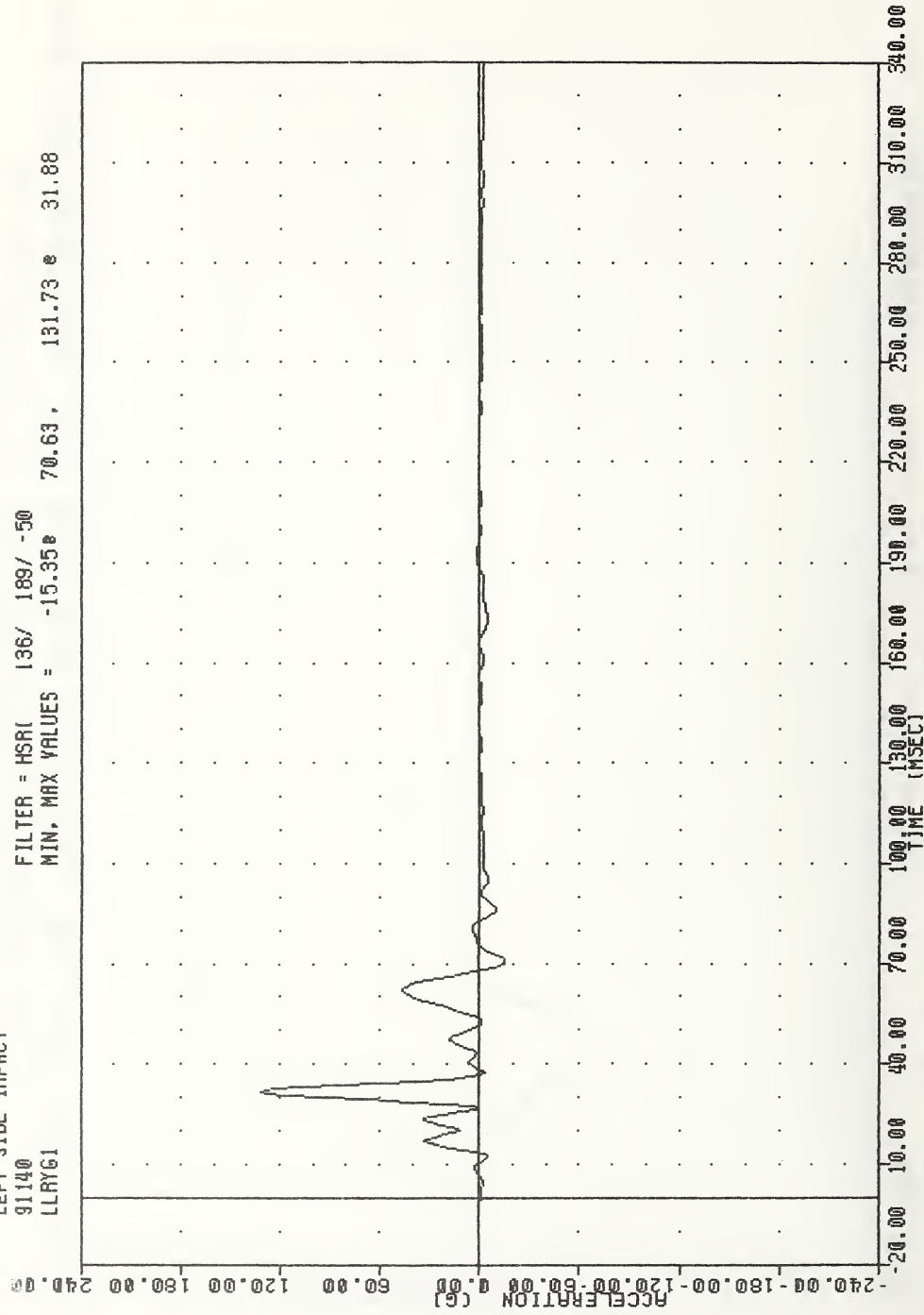


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT CENTER THORAX RIB DISPLACEMENT

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LLRY61

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = -15.35e 70.63, 131.73 e 31.88



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT LOWER THORAX RIB Y-AXIS ACCELERATION

VRTC 910520

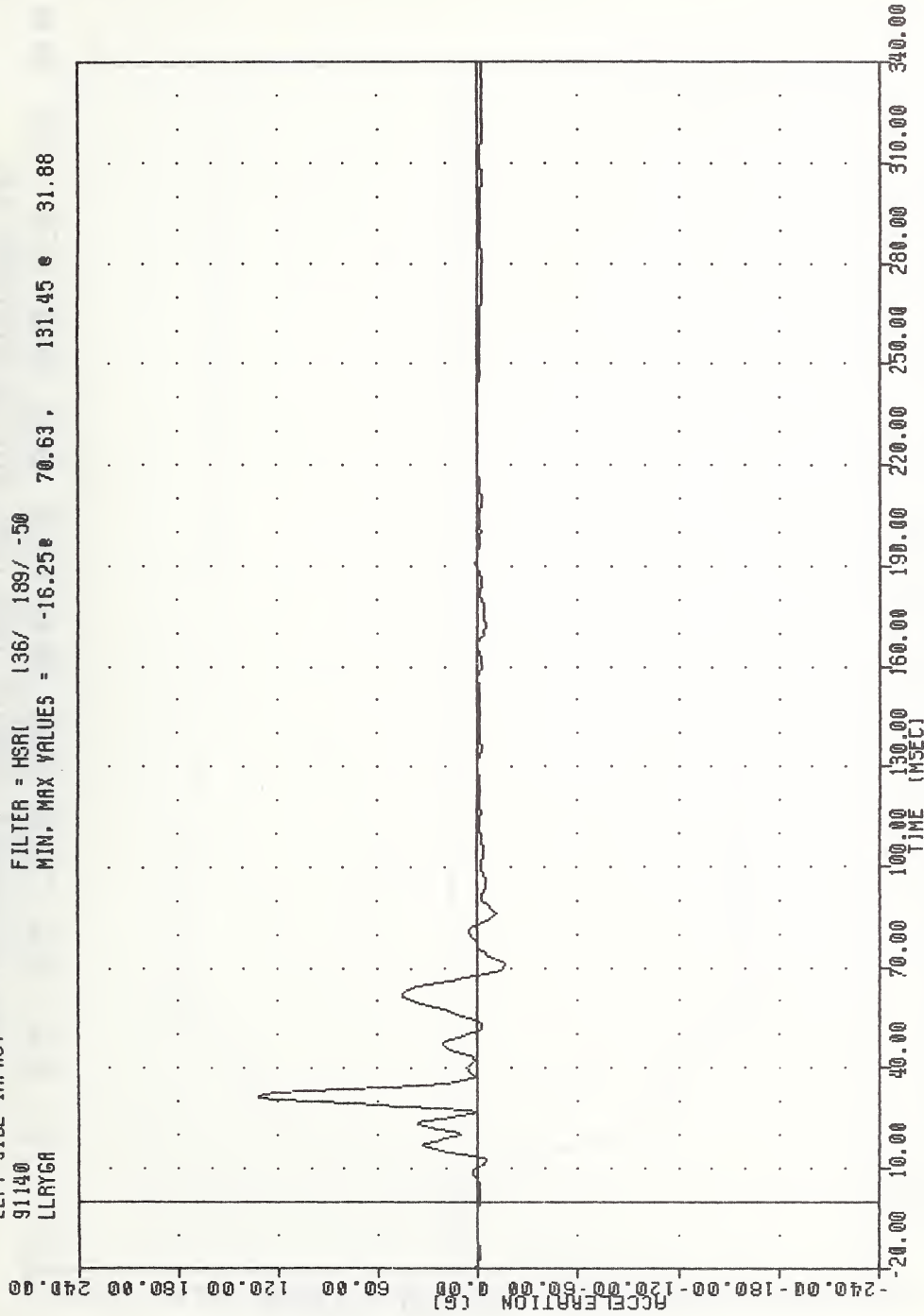
LEFT SIDE IMPACT

91140

LLRYGA

FILTER = HSAI 136/ 189/ -50

MIN. MAX VALUES = -16.25 70.63, 131.45 31.88



VRTC , 910520

LEFT SIDE IMPACT

91140

LLRYV1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES =

-0.17

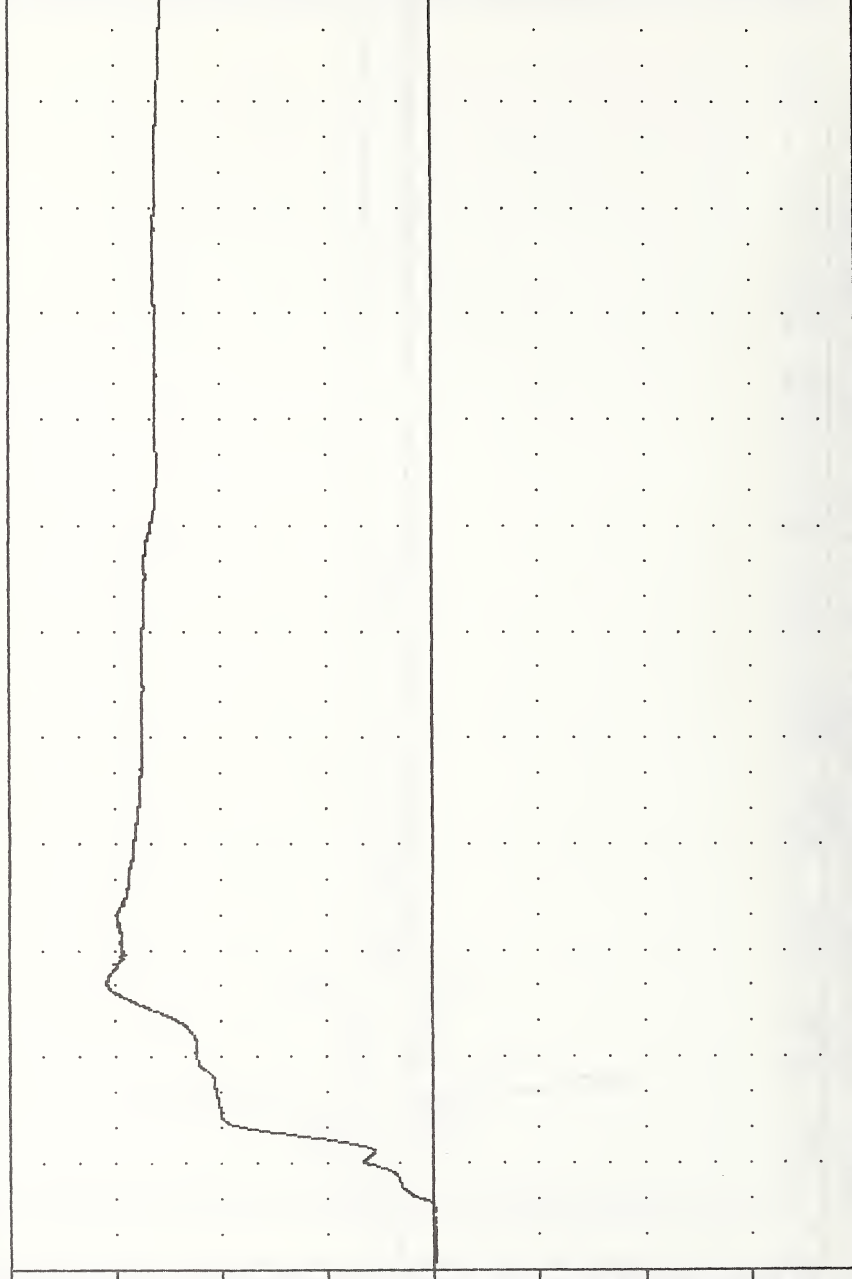
7.13,

30.73

67.50

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00

VELOCITY (MPH)



0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

300.00

TIME  
(MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

DRIVER LEFT LOWER THORAX AIB Y-AXIS VELOCITY

VRTC .910520

LEFT SIDE IMPACT

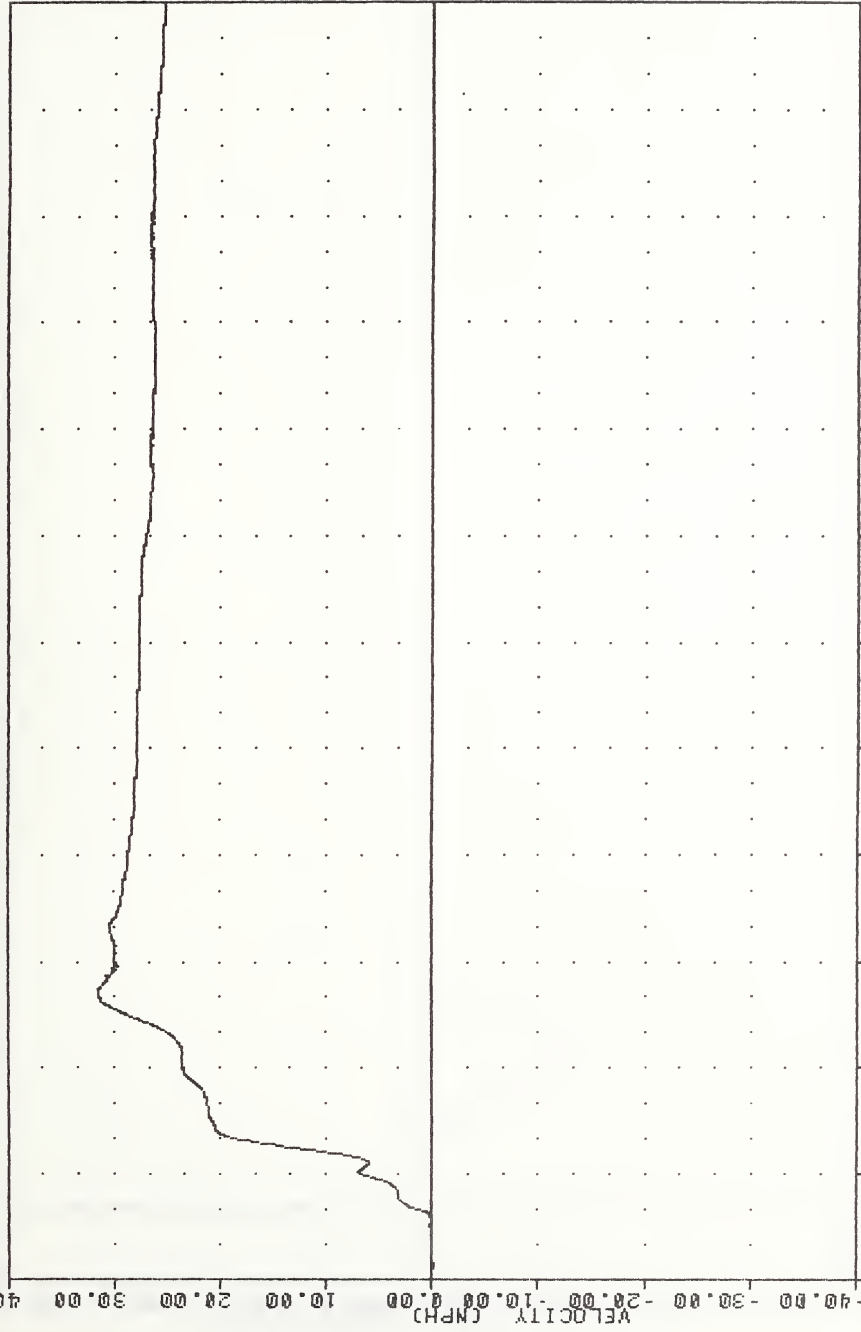
91140

LLRYVA

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -0.06 2.63

31.48 e 67.38

40.00



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT VELOCITY

VRTC - 910520

LEFT SIDE IMPACT

91140

LLRYD1

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.04e

66.00,

1.45 e

42.88

4.00

3.00

2.00

1.00

0.00

(IN)

DISPLACEMENT

-1.00

-2.00

-3.00

-4.00

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

TIME (MSEC)

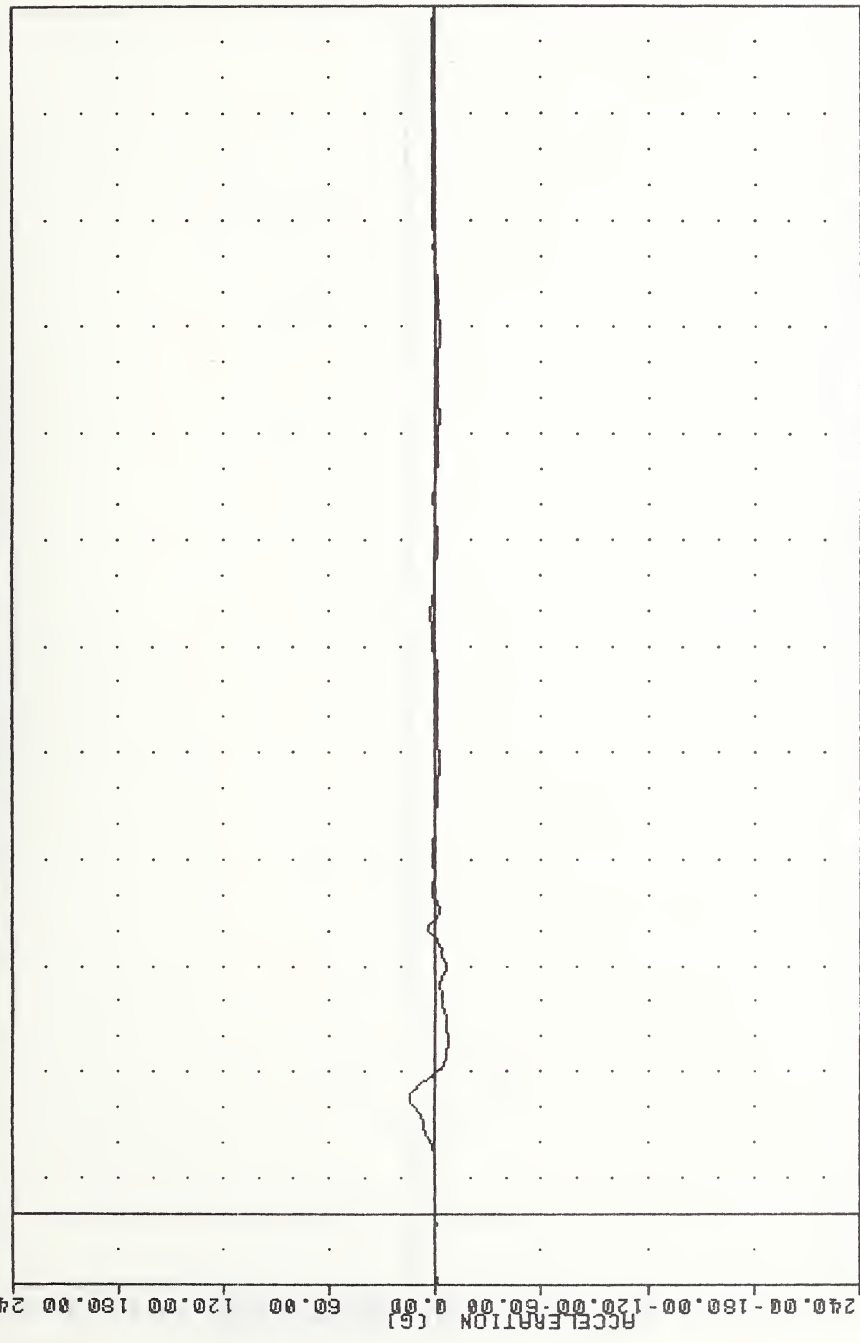
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

DRIVER LEFT LOWER THORAX RIB DISPLACEMENT

VRTC . 910520  
LEFT SIDE IMPACT  
91140  
712XG1

FILTER = HSR1 136/ -50  
MIN. MAX VALUES = -7.90 48.75

14.49 e 32.50



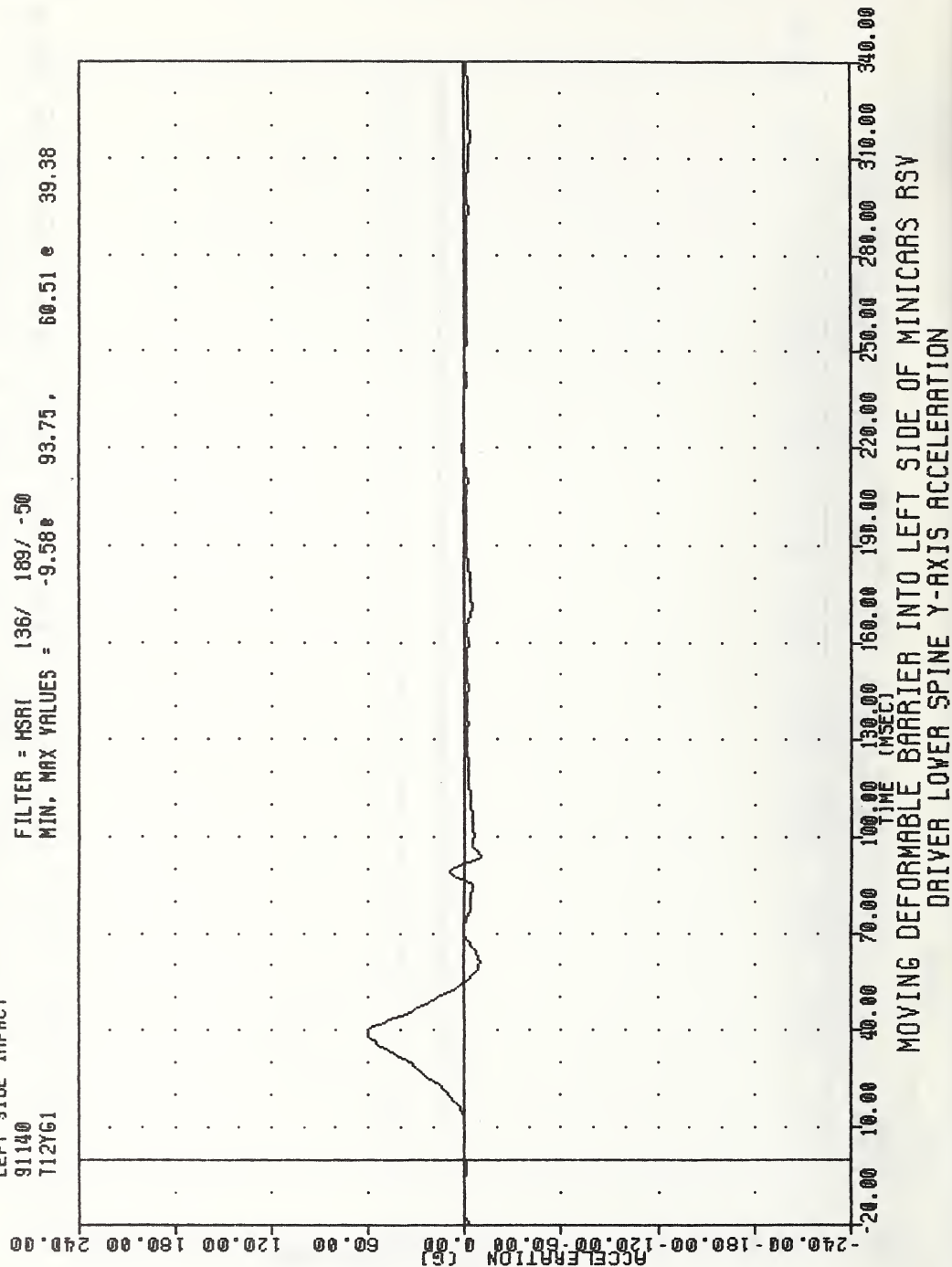
-240.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE X-AXIS ACCELERATION



VRTC , 910520  
LEFT SIDE IMPACT  
91140  
712Y61

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -9.58e 93.75, 60.51 e 39.38

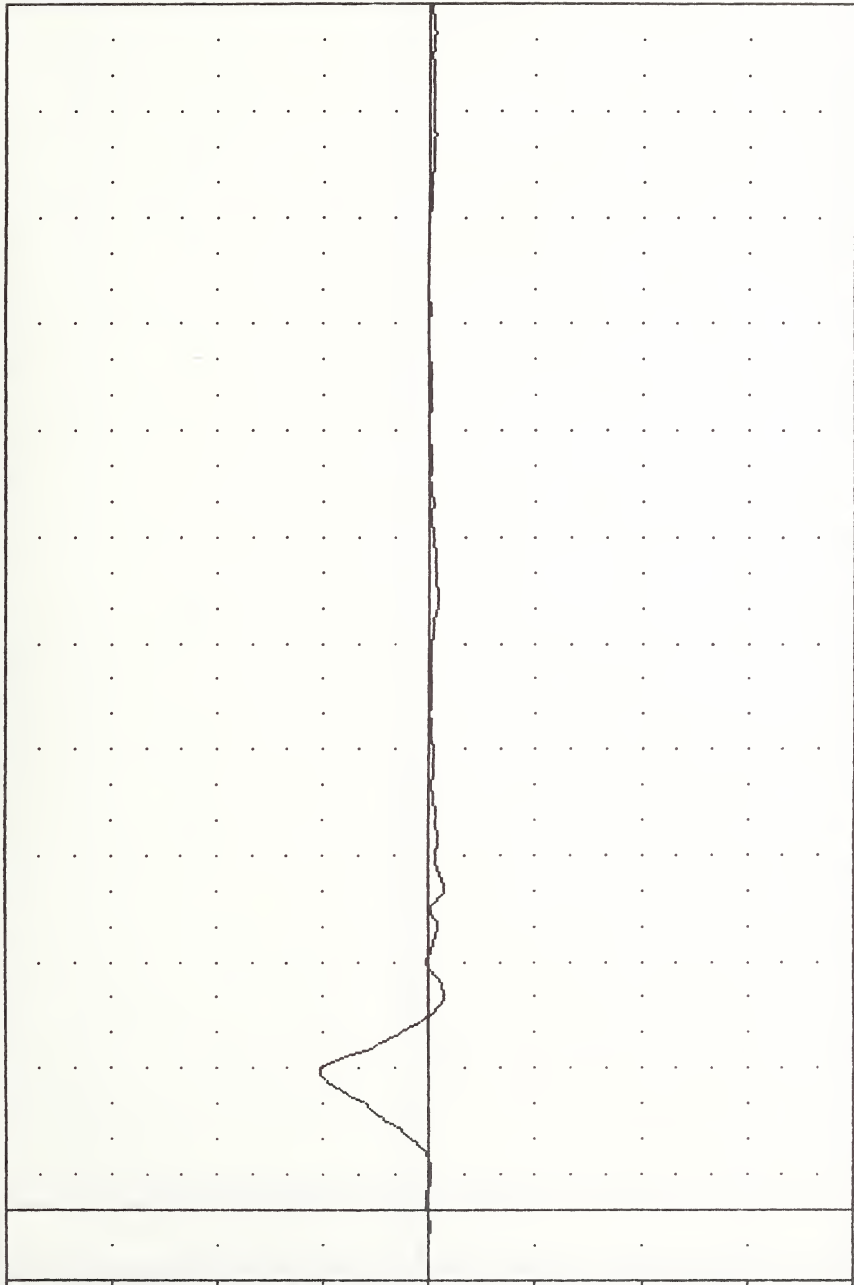


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE Y-AXIS ACCELERATION

VRTC , 910520  
 LEFT SIDE IMPACT  
 91140  
 112YGR

FILTER = HSRI 136/ 189/ -50  
 MIN. MAX VALUES = 90.62 , 61.69 @ 39.38

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
 DRIVER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION



WRTC , 910520

LEFT SIDE IMPACT

91140

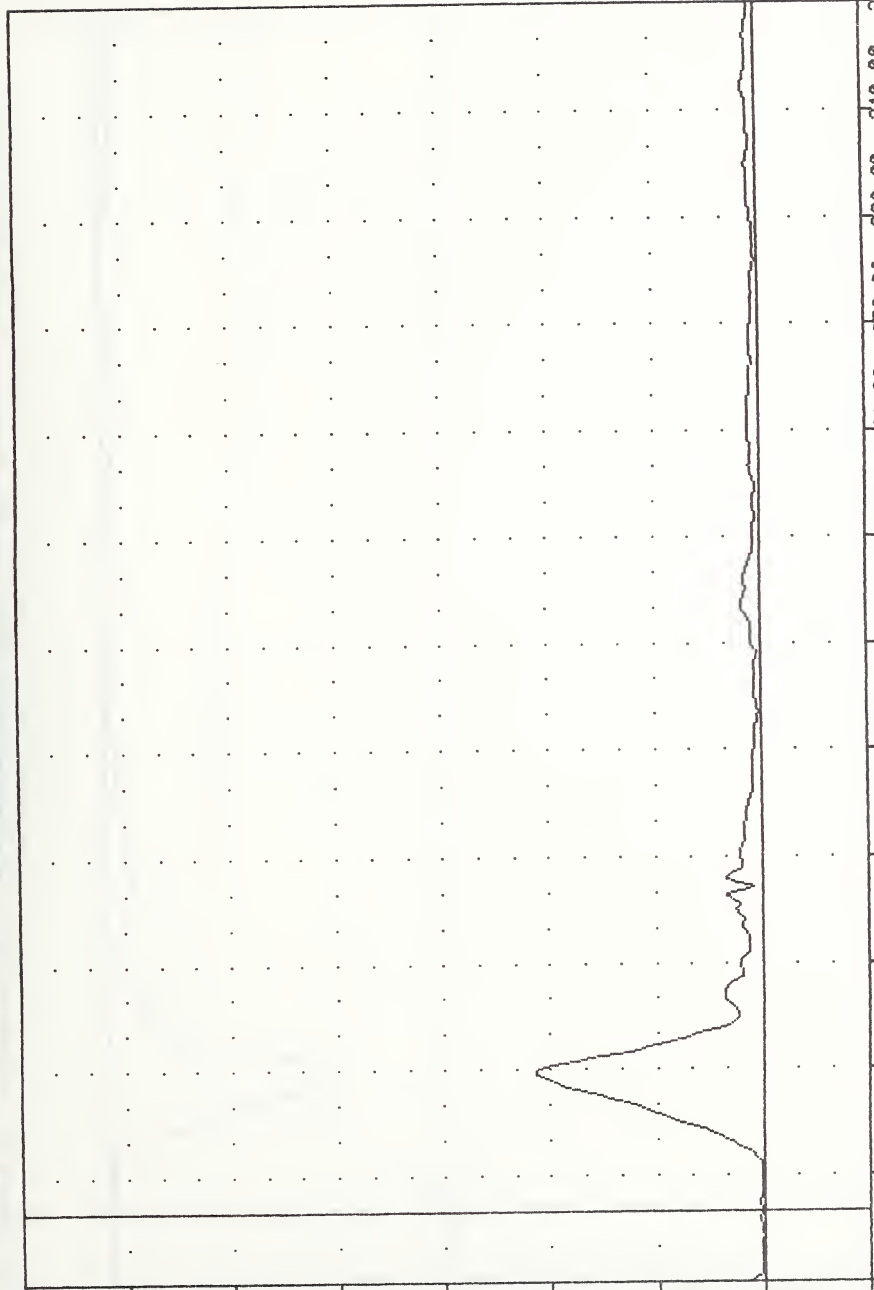
112861

FILTER = HSAI 136/ 189/ -50

MIN. MAX VALUES = 0.06e

-7.50 , 63.91 e 39.38

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE RESULTANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

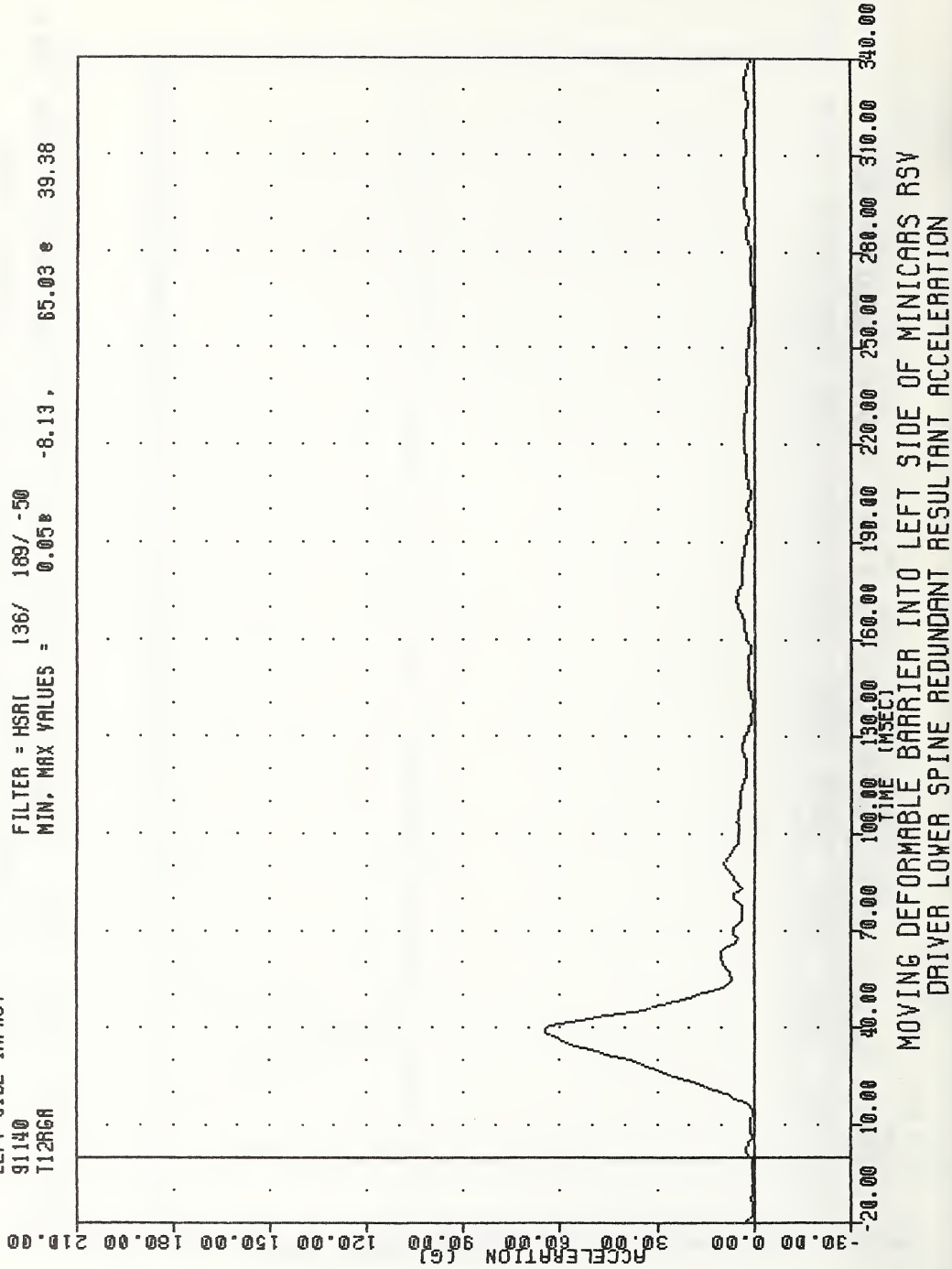
91140

T12R6A

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = 0.05 e

-8.13, 65.03 e 39.38



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE REDUNDANT RESULTANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

T12YV1

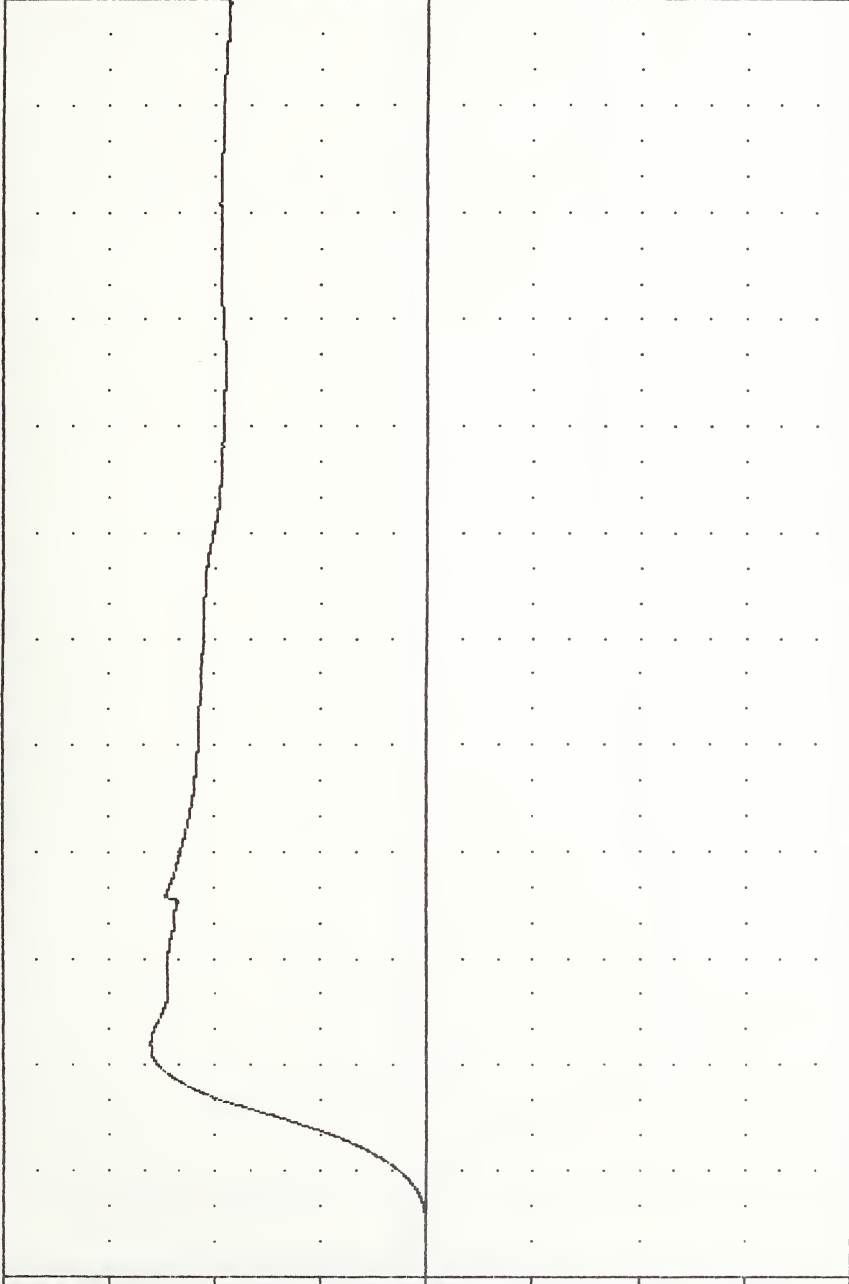
FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.02%

1.00 , 26.05 @ 55.00

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00

VELOCITY (MPH)



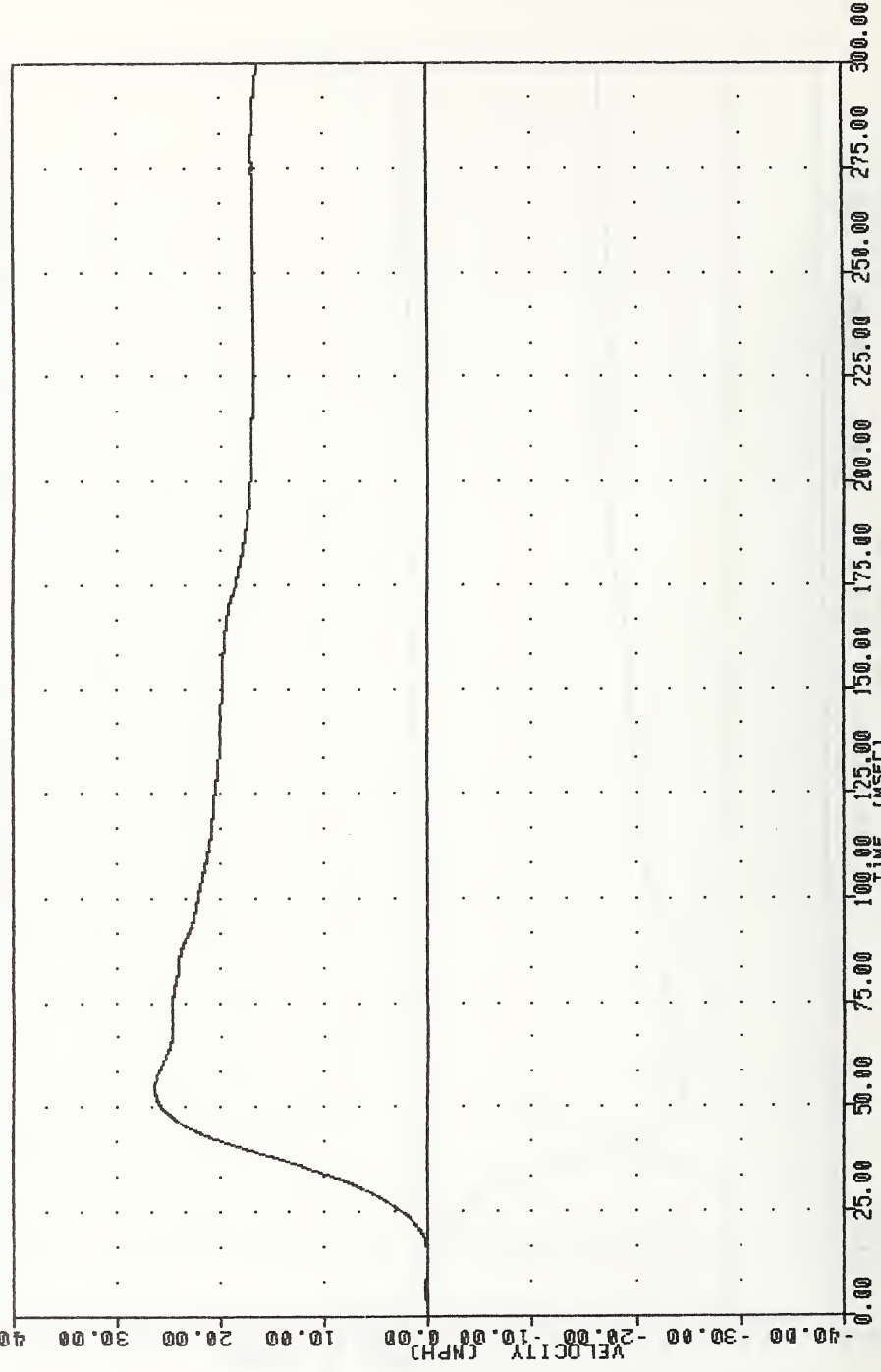
0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE Y-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
112VVA

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.00e 0.13, 26.33 e 54.13



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LOWER SPINE Y-AXIS REDUNDANT VELOCITY



VRTC , 910520

LEFT SIDE IMPACT

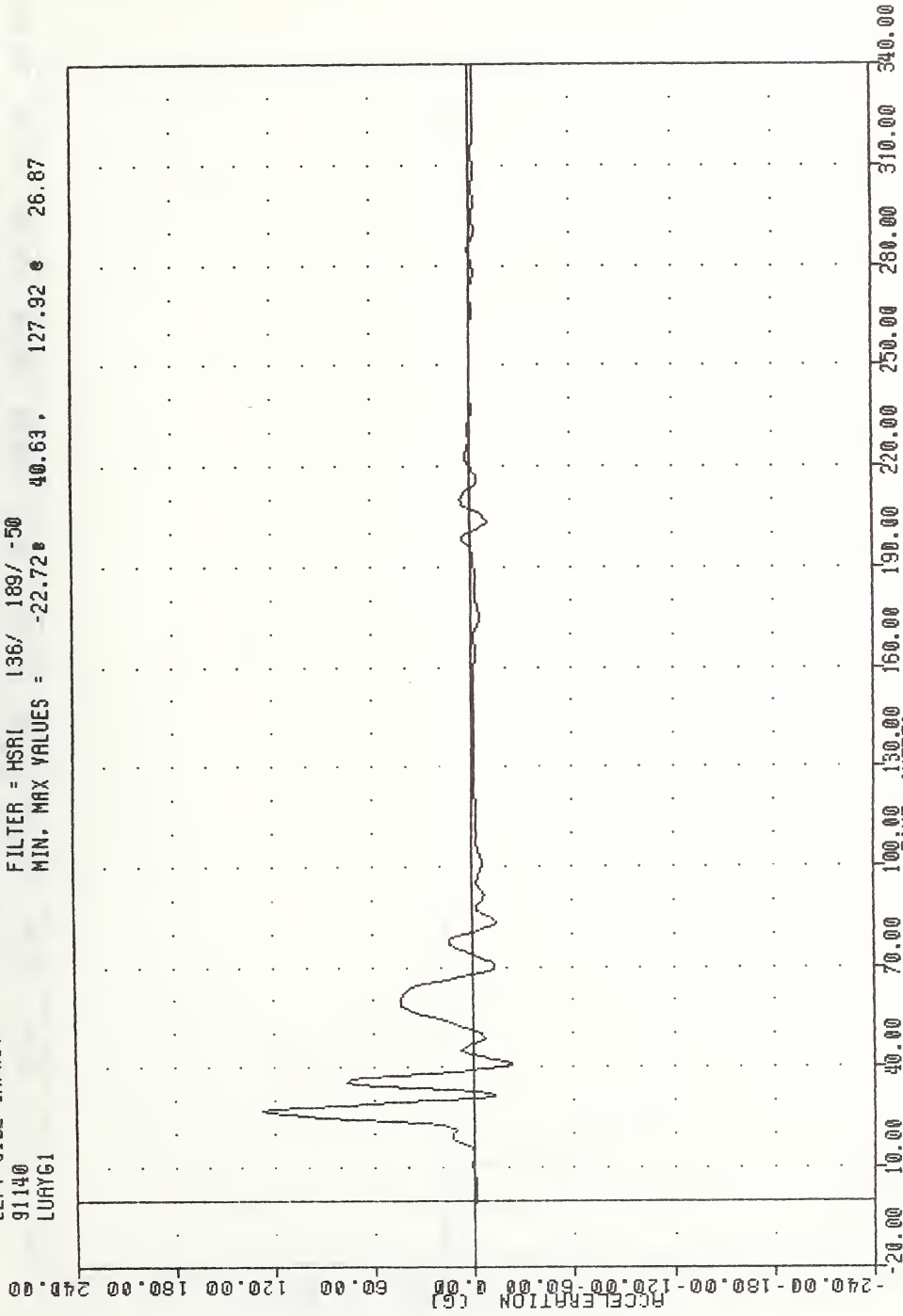
91140

LUAYG1

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -22.72 40.63

127.92 26.87



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER ABDOMEN RIB Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

LWAYV1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.17e

8.75 ,

31.17 e

80.25

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

VELOCITY (MPH)

0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

300.00

TIME (INSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER ABDOMEN RIB Y-AXIS VELOCITY

VRTC , 910520

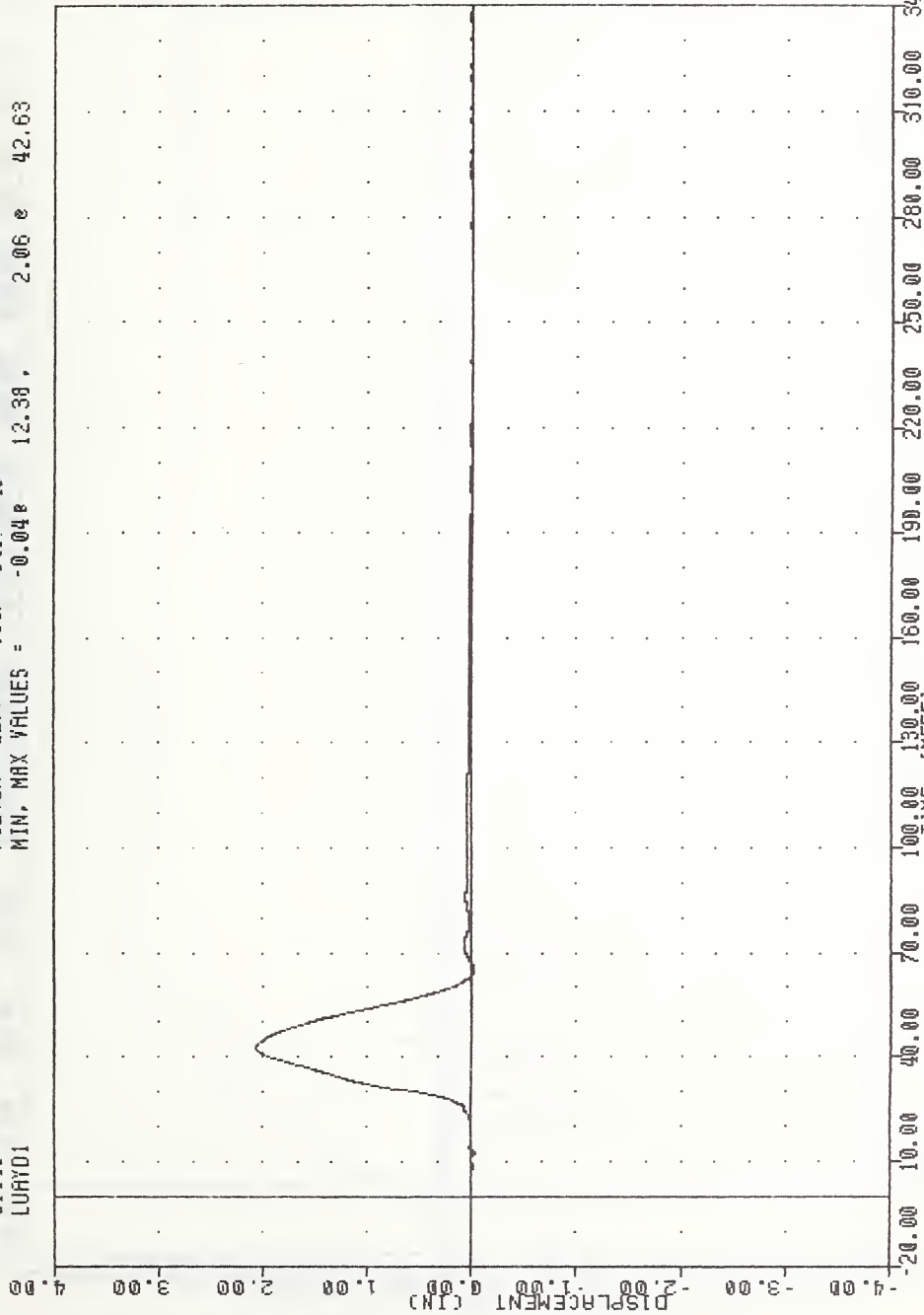
LEFT SIDE IMPACT

91140

LWAY01

FILTER = BLPF 300/ 943/ -40

MIN, MAX VALUES = -0.048 12.38 , 2.06 e 42.63



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT UPPER ABDOMEN RIB DISPLACEMENT

VRTC . 910520

LEFT SIDE IMPACT

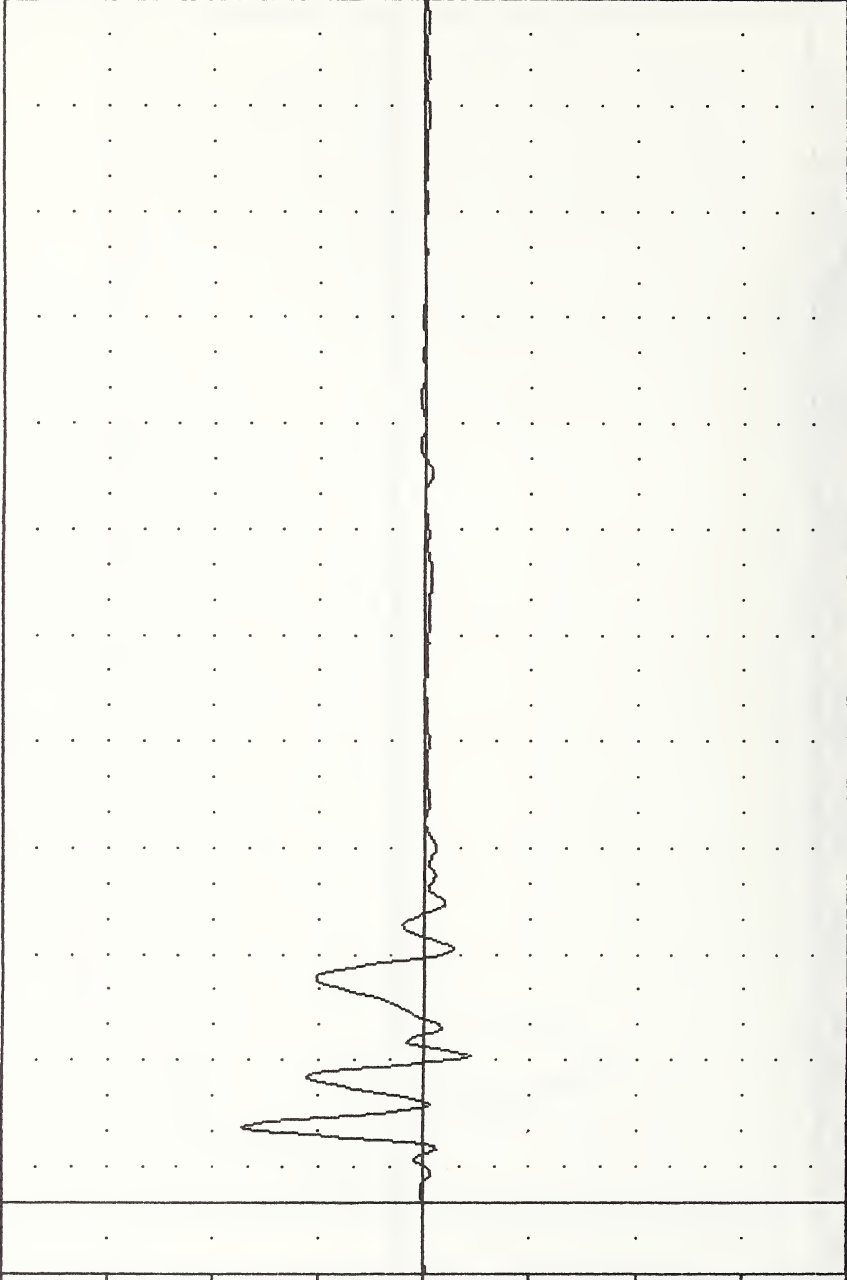
91140

LLAYG1

FILTER = HSR( 136/ 189/ -50

MIN. MAX VALUES = -25.86 41.25, 103.92 e 21.25

ACCELERATION (G)



240.00 180.00 120.00 60.00 0.00 -60.00 -120.00 -180.00 -240.00

0.00 10.00 20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT LOWER ABDOMEN RIB Y-AXIS ACCELERATION

VRTC . 910520

LEFT SIDE IMPACT

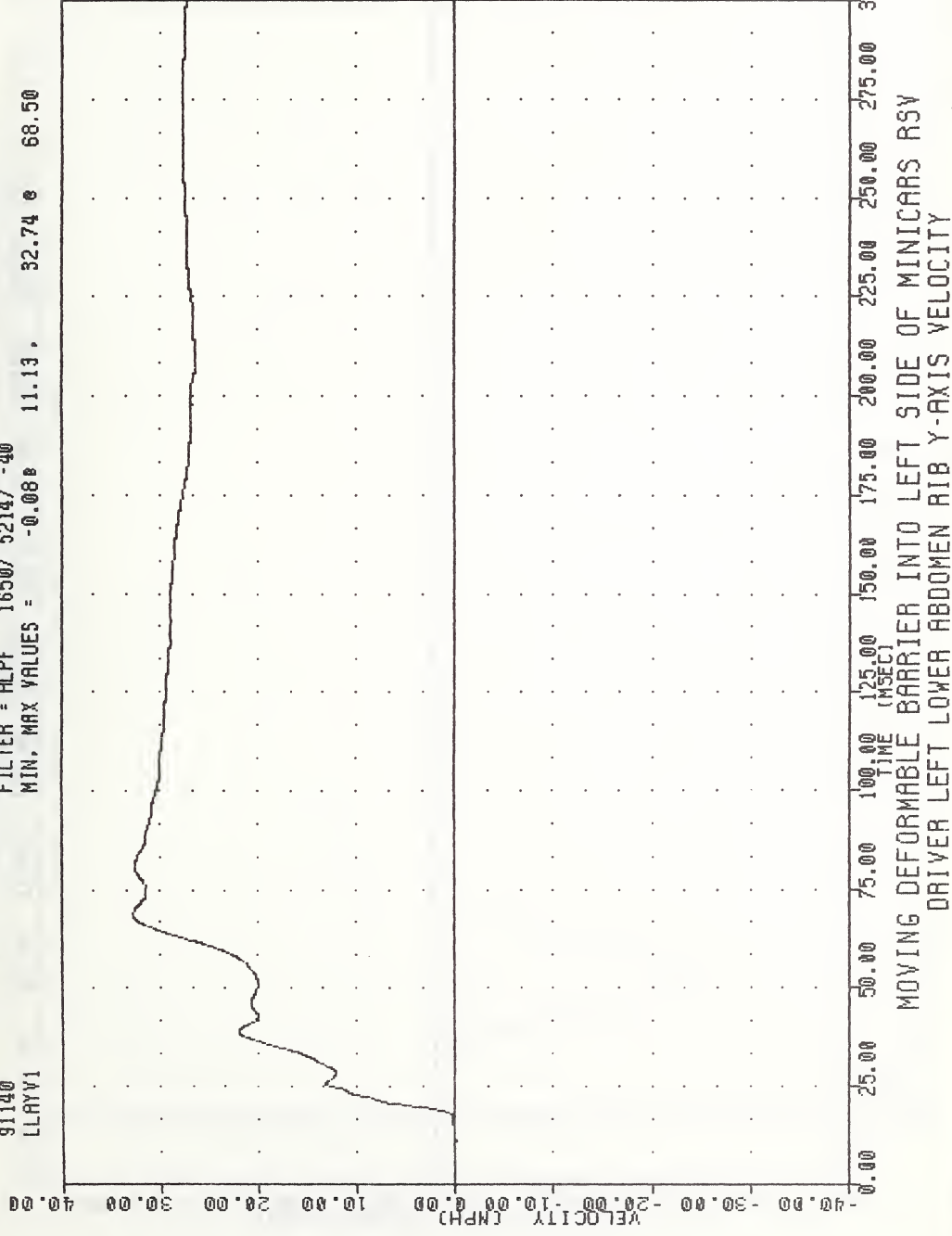
91140

LLAYV1

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -0.088

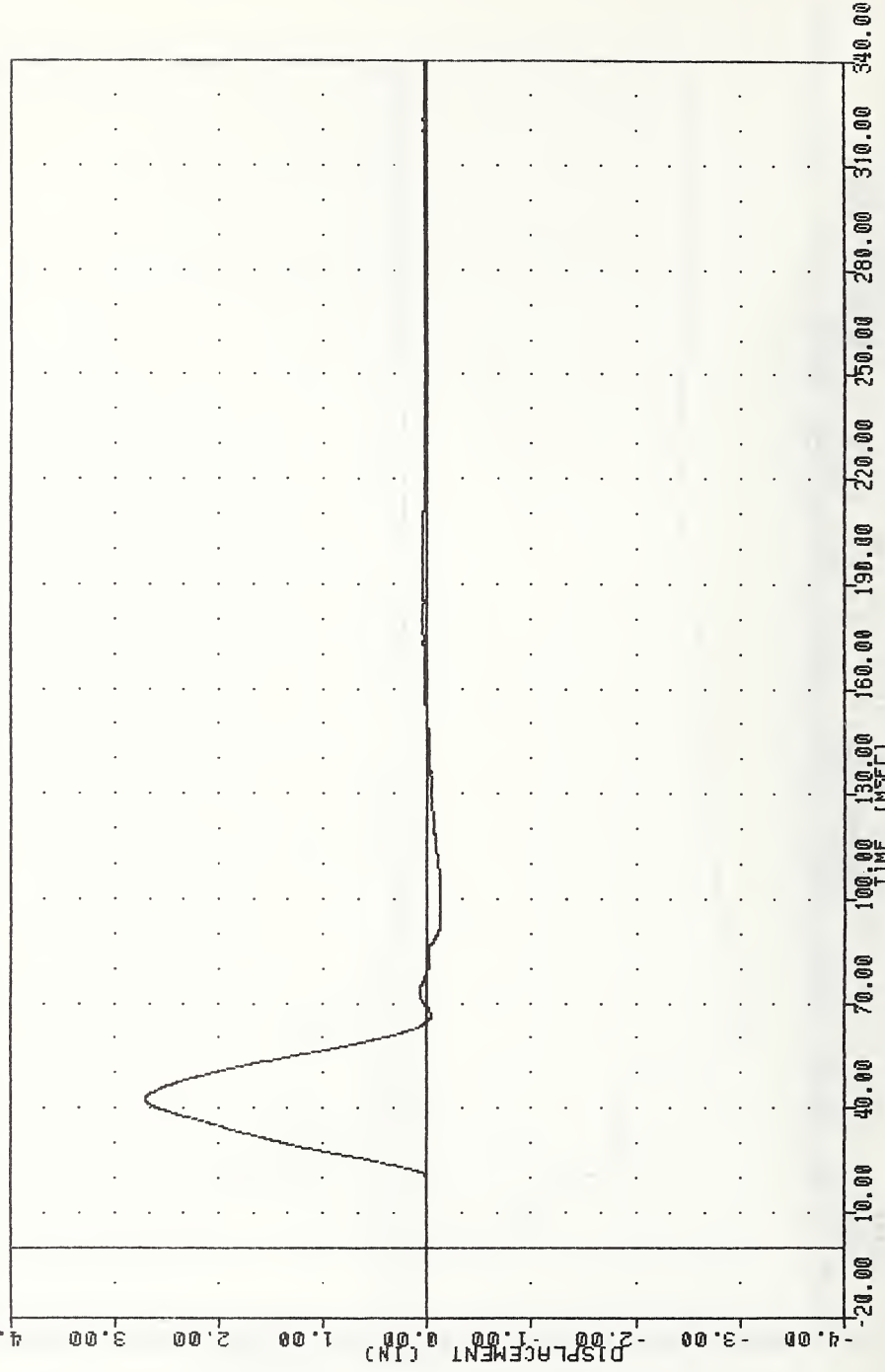
11.13, 32.74 @ 68.50



VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LLAYD1

FILTER = BLPF 300/ 949/ -40  
MIN, MAX VALUES = -0.13e

97.00 , 2.70 e 42.50



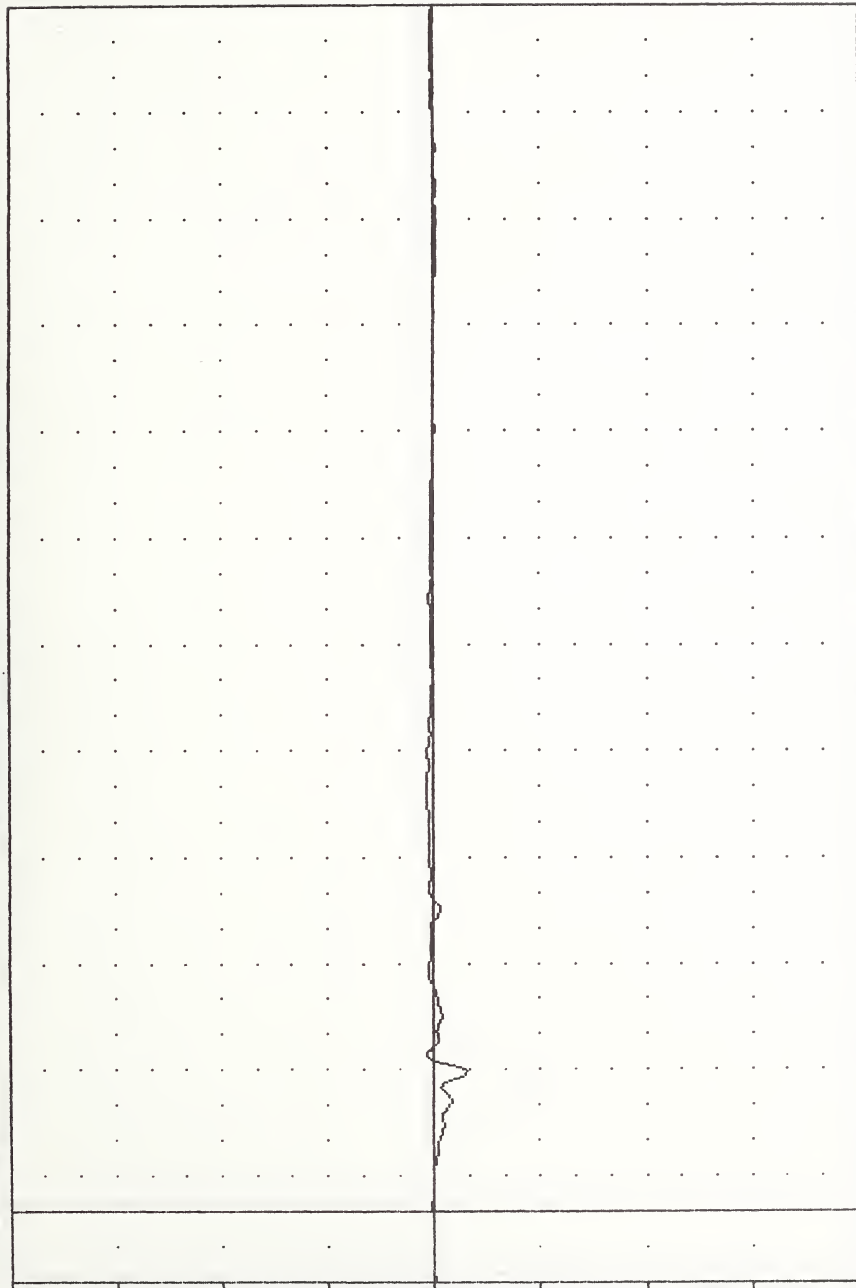
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER LEFT LOWER ABDOMEN RIB DISPLACEMENT

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
PEVXG1

FILTER = HSRI 136/ 189/ -50  
MIN, MAX VALUES = -18.23 39.38 ,

4.54 44.38

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER PELVIS X-AXIS ACCELERATION



VRTC , 910520  
LEFT SIDE IMPACT  
91140  
PEVY61

FILTER = HSR1 136/ 189/ -50

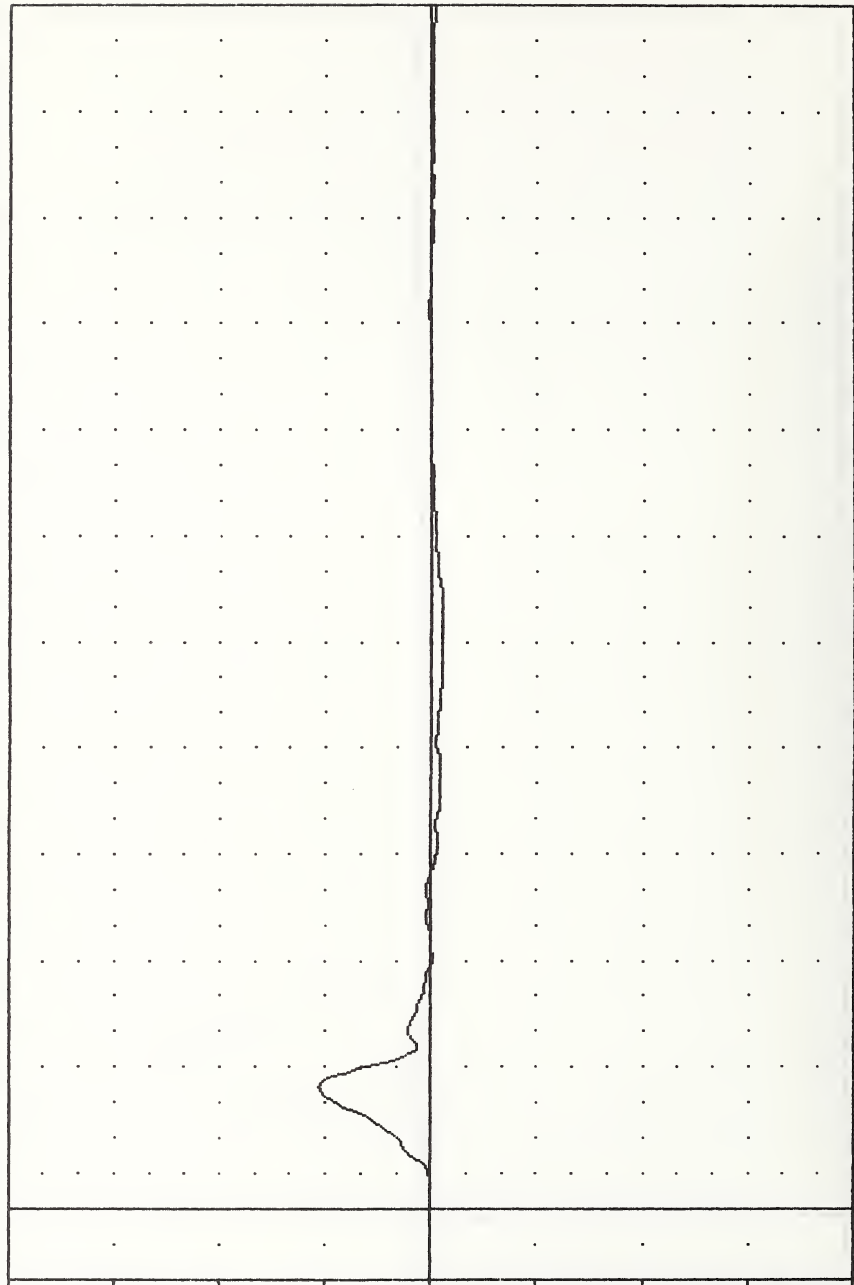
MIN, MAX VALUES =

160.63 ,

63.39 e

34.38

ACCELERATION (G)



340.00

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER PELVIS Y-AXIS ACCELERATION

VRIC . 910520

LEFT SIDE IMPACT

91140

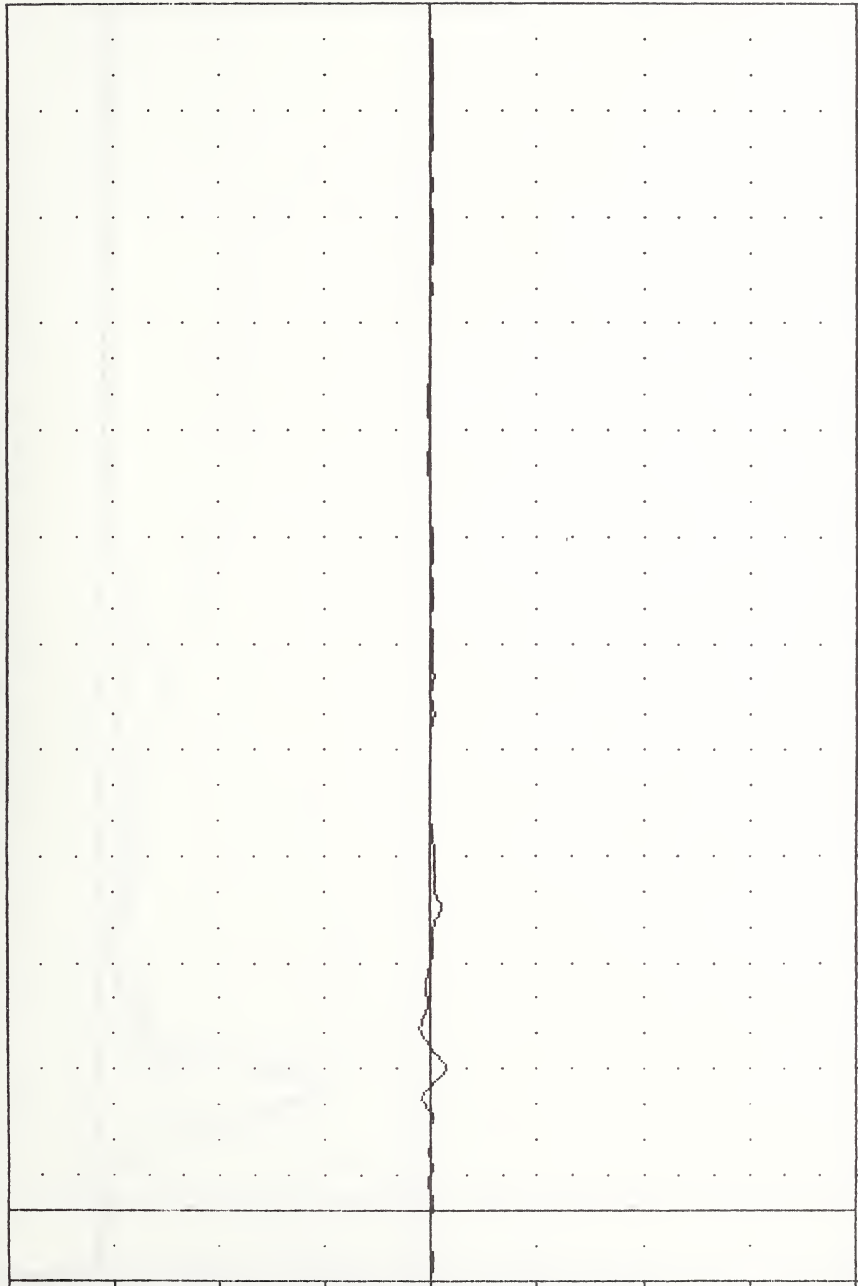
PEVZ61

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -8.89g

40.63, 6.29 g 51.25

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
DRIVER PELVIS Z-AXIS ACCELERATION

VRIC , 910520

LEFT SIDE IMPACT

91140

PEVR61

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = 0.15e 217.50, 63.55 e 34.38

210.00

180.00

160.00

140.00

120.00

100.00

80.00

60.00

40.00

20.00

0.00

-20.00

-40.00

-60.00

-80.00

-100.00

-120.00

-140.00

-160.00

-180.00

-200.00

-220.00

-240.00

-260.00

-280.00

-300.00

-320.00

-340.00

-360.00

-380.00

-400.00

-420.00

-440.00

-460.00

-480.00

-500.00

-520.00

-540.00

-560.00

-580.00

-600.00

-620.00

-640.00

-660.00

-680.00

-700.00

-720.00

-740.00

-760.00

-780.00

-800.00

-820.00

-840.00

-860.00

-880.00

-900.00

-920.00

-940.00

-960.00

-980.00

-1000.00

-1020.00

-1040.00

-1060.00

-1080.00

-1100.00

-1120.00

-1140.00

-1160.00

-1180.00

-1200.00

-1220.00

-1240.00

-1260.00

-1280.00

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-1380.00

-1400.00

-1420.00

-1440.00

-1460.00

-1480.00

-1500.00

-1520.00

-1540.00

-1560.00

-1580.00

-1600.00

-1620.00

-1640.00

-1660.00

-1680.00

-1700.00

-1720.00

-1740.00

-1760.00

-1780.00

-1800.00

-1820.00

-1840.00

-1860.00

-1880.00

-1900.00

-1920.00

-1940.00

-1960.00

-1980.00

-2000.00

-2020.00

-2040.00

-2060.00

-2080.00

-2100.00

-2120.00

-2140.00

-2160.00

-2180.00

-2200.00

-2220.00

-2240.00

-2260.00

-2280.00

-2300.00

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-2500.00

-2520.00

-2540.00

-2560.00

-2580.00

-2600.00

-2620.00

-2640.00

-2660.00

-2680.00

-2700.00

-2720.00

-2740.00

-2760.00

-2780.00

-2800.00

-2820.00

-2840.00

-2860.00

-2880.00

-2900.00

-2920.00

-2940.00

-2960.00

-2980.00

-3000.00

-3020.00

-3040.00

-3060.00

-3080.00

-3100.00

-3120.00

-3140.00

-3160.00

-3180.00

-3200.00

-3220.00

-3240.00

-3260.00

-3280.00

-3300.00

-3320.00

-3340.00

-3360.00

-3380.00

-3400.00

-3420.00

-3440.00

-3460.00

-3480.00

-3500.00

-3520.00

-3540.00

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-3580.00

-3600.00

-3620.00

-3640.00

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-3780.00

-3800.00

-3820.00

-3840.00

-3860.00

-3880.00

-3900.00

-3920.00

-3940.00

-3960.00

-3980.00

-4000.00

-4020.00

-4040.00

-4060.00

-4080.00

-4100.00

-4120.00

-4140.00

-4160.00

-4180.00

-4200.00

-4220.00

-4240.00

-4260.00

-4280.00

-4300.00

-4320.00

-4340.00

-4360.00

-4380.00

-4400.00

-4420.00

-4440.00

-4460.00

-4480.00

-4500.00

-4520.00

-4540.00

-4560.00

-4580.00

-4600.00

-4620.00

-4640.00

-4660.00

-4680.00

-4700.00

-4720.00

-4740.00

-4760.00

-4780.00

-4800.00

-4820.00

-4840.00

-4860.00

-4880.00

-4900.00

-4920.00

-4940.00

-4960.00

-4980.00

-5000.00

-5020.00

-5040.00

-5060.00

-5080.00

-5100.00

-5120.00

-5140.00

-5160.00

-5180.00

-5200.00

-5220.00

-5240.00

-5260.00

-5280.00

-5300.00

-5320.00

-5340.00

-5360.00

-5380.00

-5400.00

-5420.00

-5440.00

-5460.00

-5480.00

-5500.00

-5520.00

-5540.00

-5560.00

-5580.00

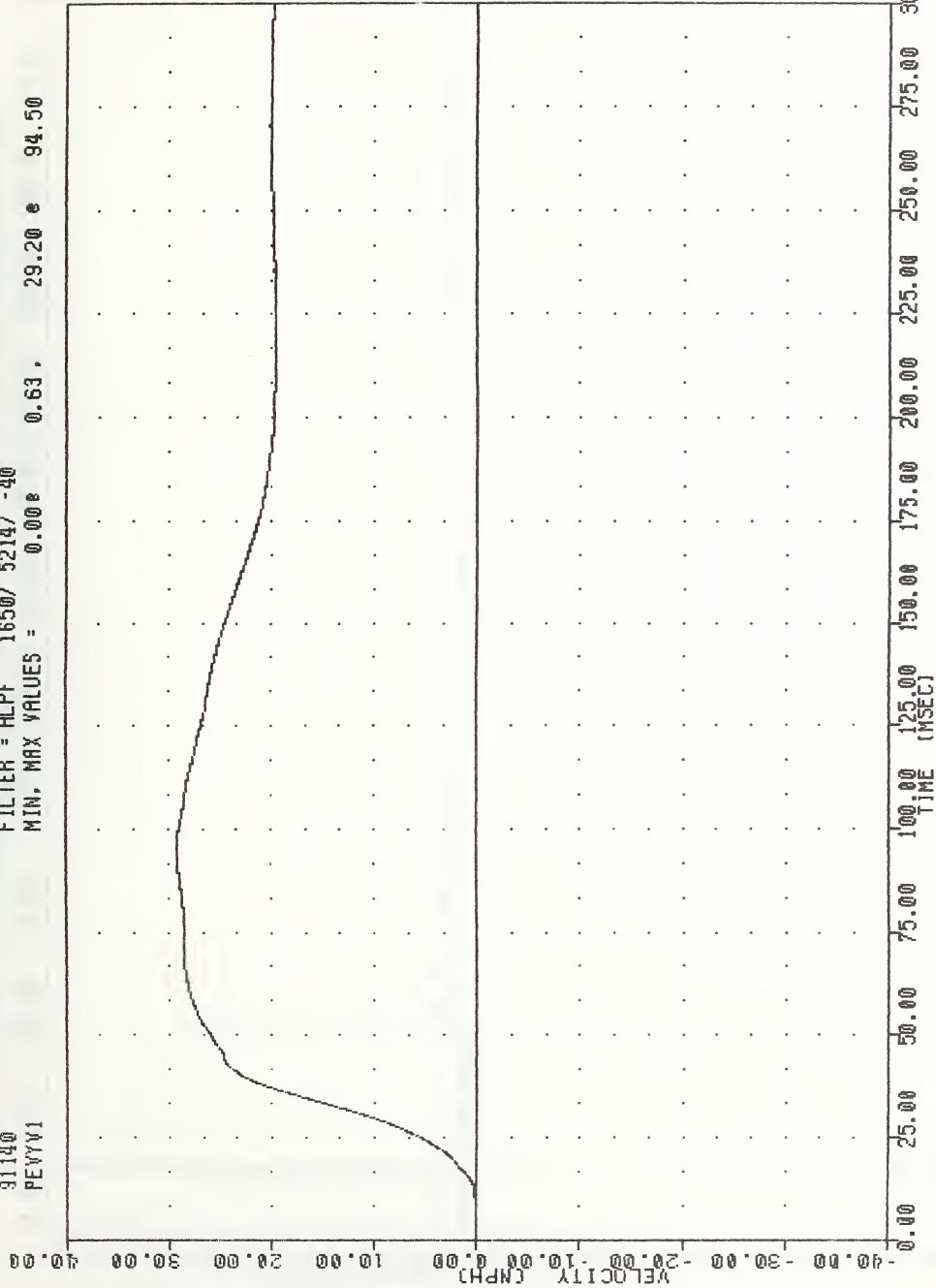
-5600.00

-5620.00

VRTC , 910520  
 LEFT SIDE IMPACT  
 91140  
 PEVTV1

FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = 0.00 s

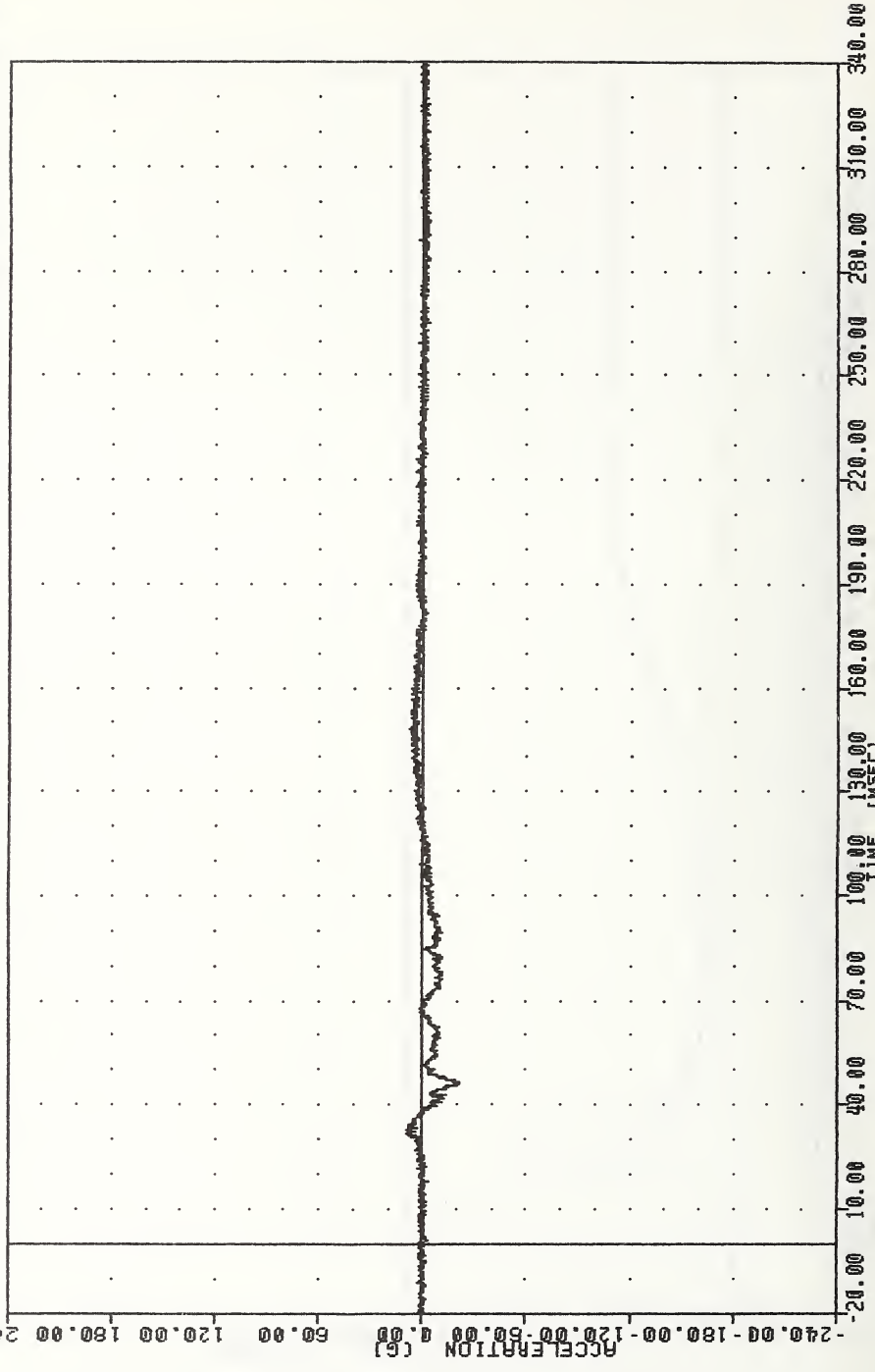
0.63 , 29.20 s 94.50



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
 DRIVER PELVIS Y-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
HEDXG4

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = -21.88 46.38 9.36 e 32.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER HEAD X-AXIS ACCELERATION

VRIC . 910520

LEFT SIDE IMPACT

91140

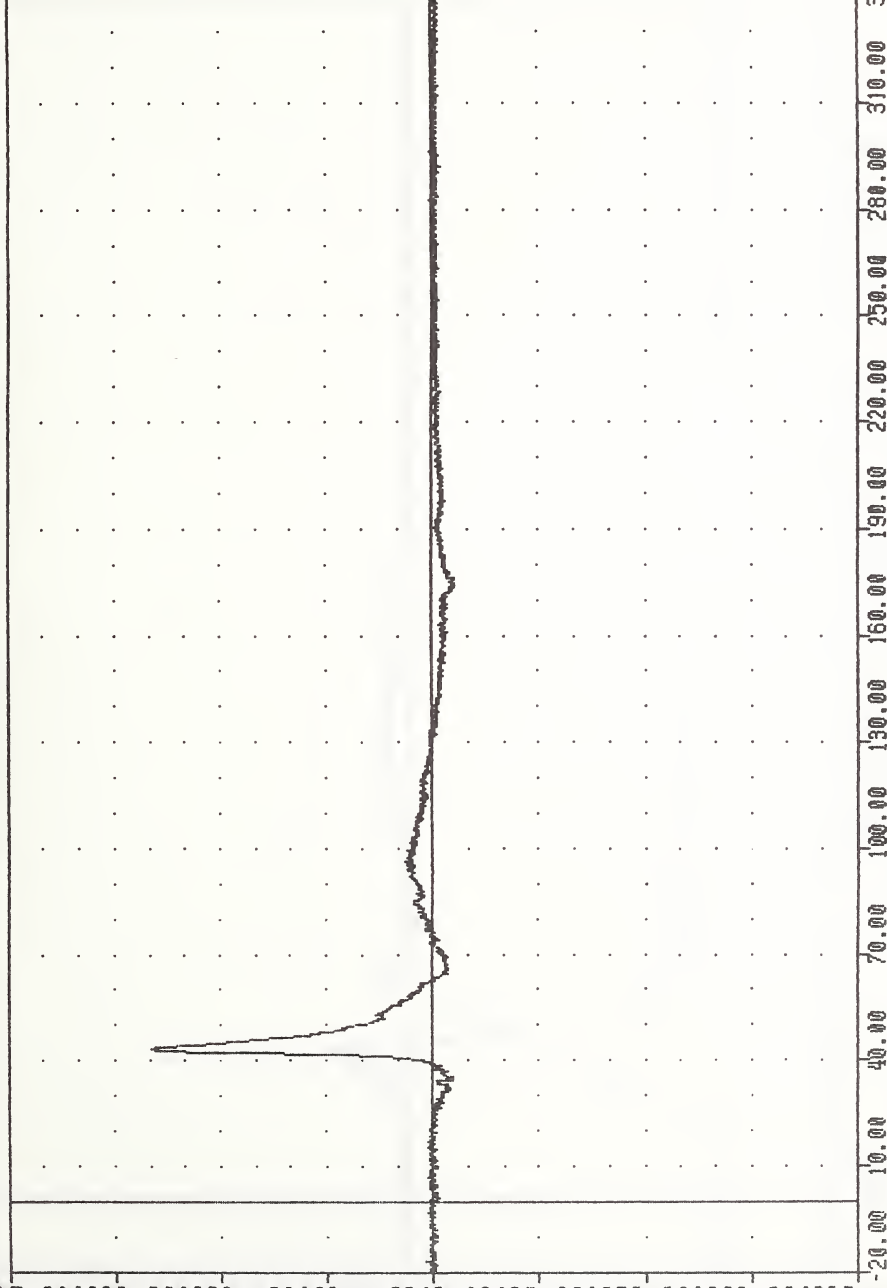
HEDYG4

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = -12.74 175.50 ,

159.75 e 43.25

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER HEAD Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

HEDZG4

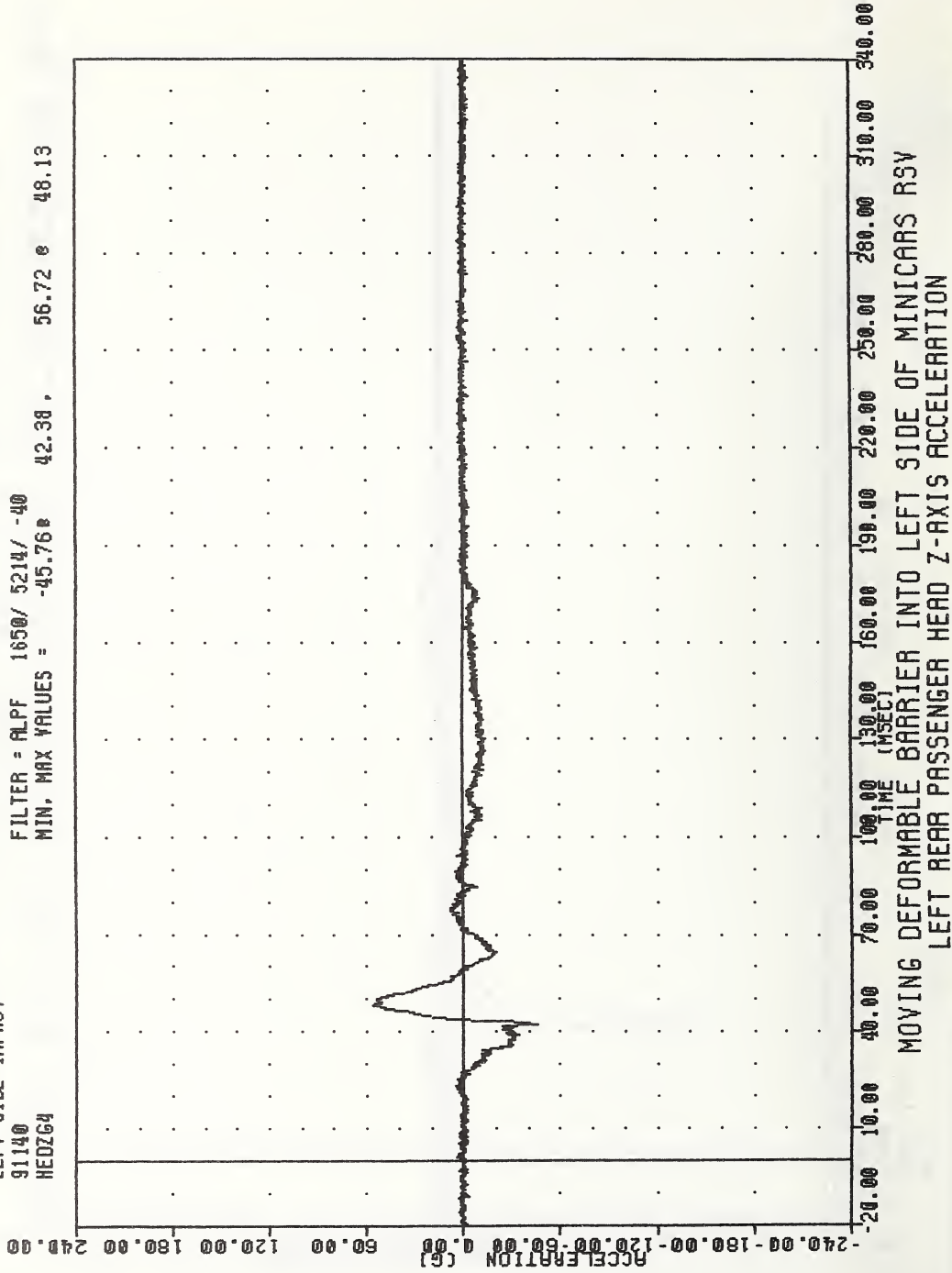
FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -45.76

42.38 ,

56.72

48.13





NRTC , 910520

LEFT SIDE IMPACT

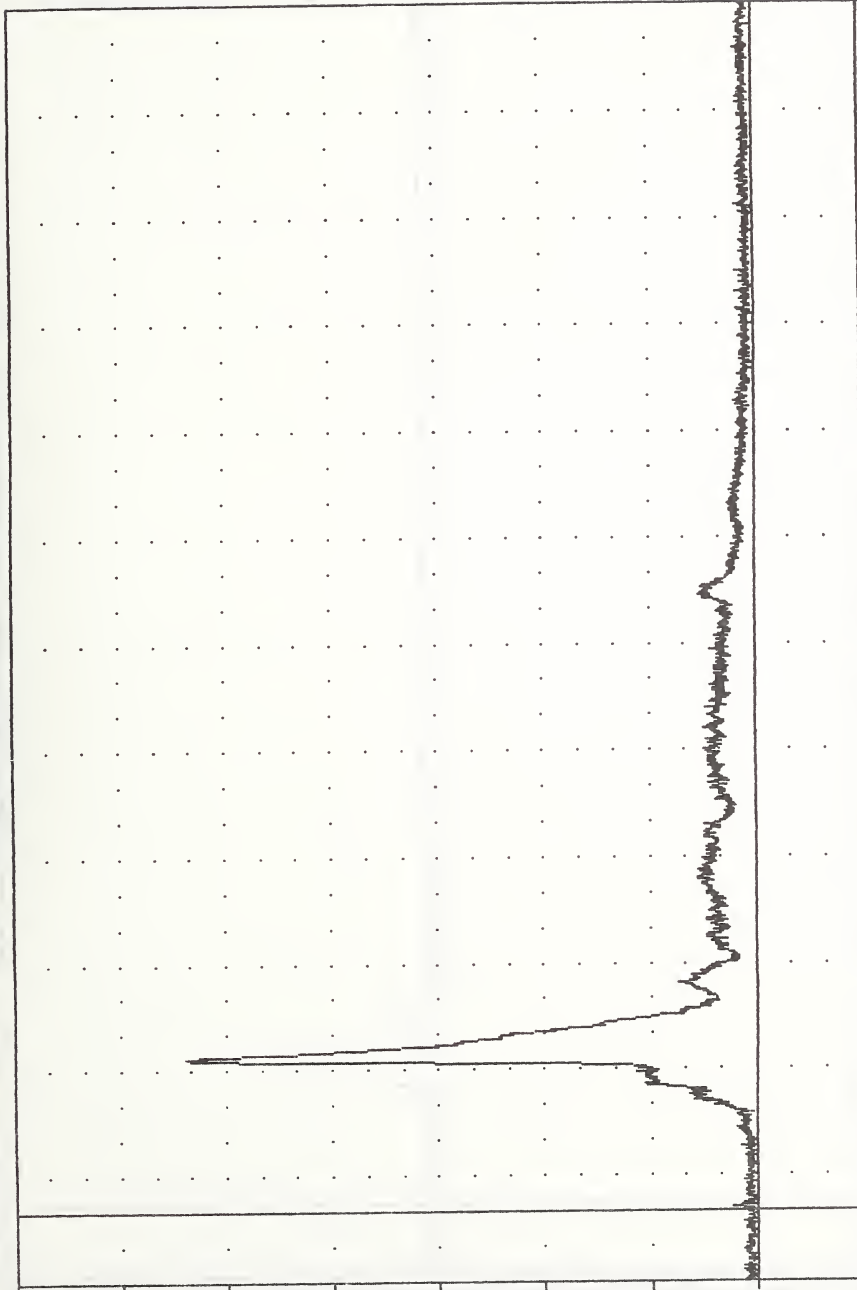
91140

HE0664

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 0.15e 299.50 , 161.61 e 43.25

ACCELERATION (G)



30.00 210.00 180.00 150.00 120.00 90.00 60.00 30.00 0.00 -30.00

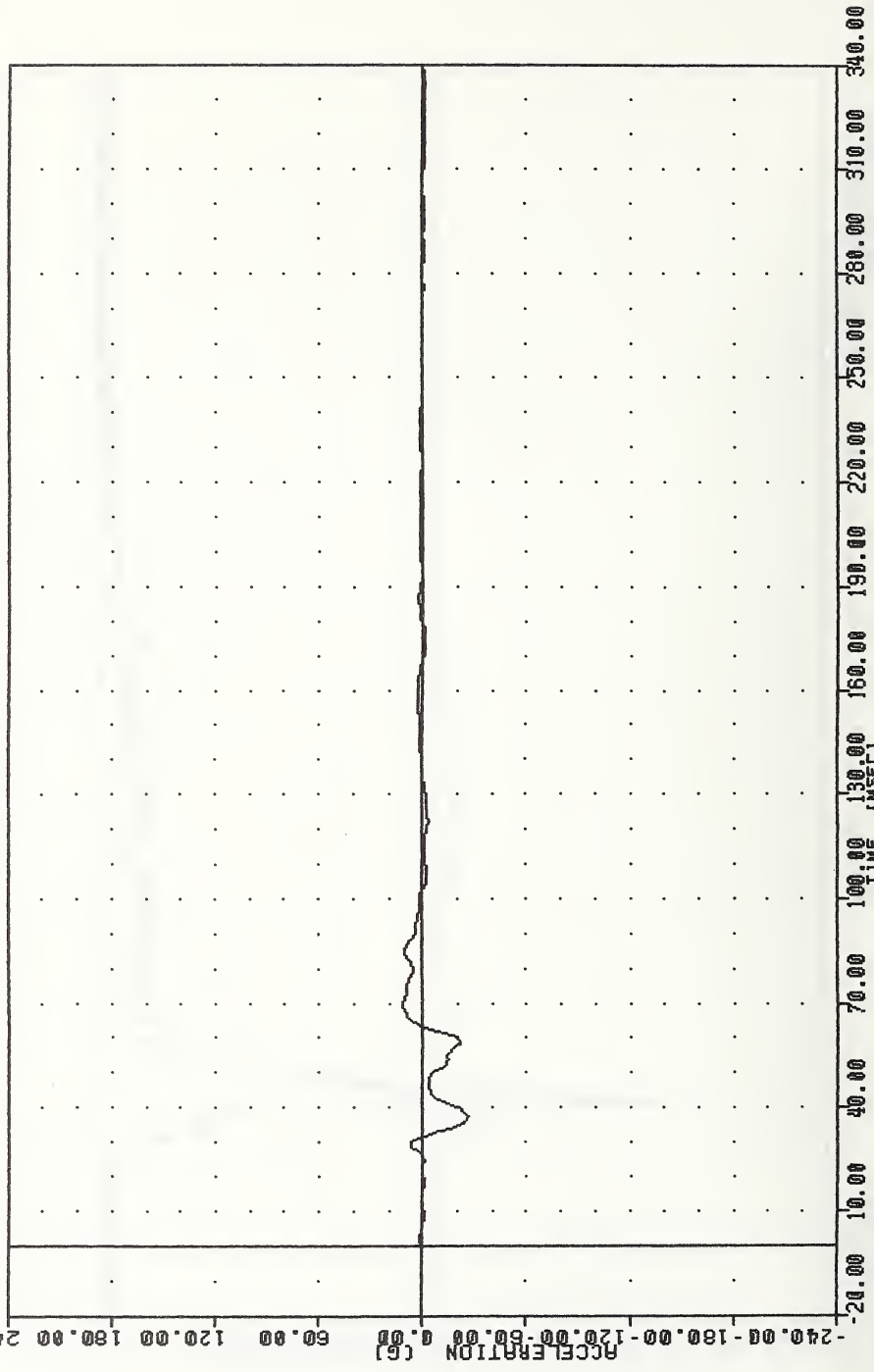
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

TIME (msec)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER HEAD RESULTANT ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
T01XG4

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -25.82 37.50 11.39 69.38



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER UPPER SPINE X-AXIS ACCELERATION

WRTC , 910520

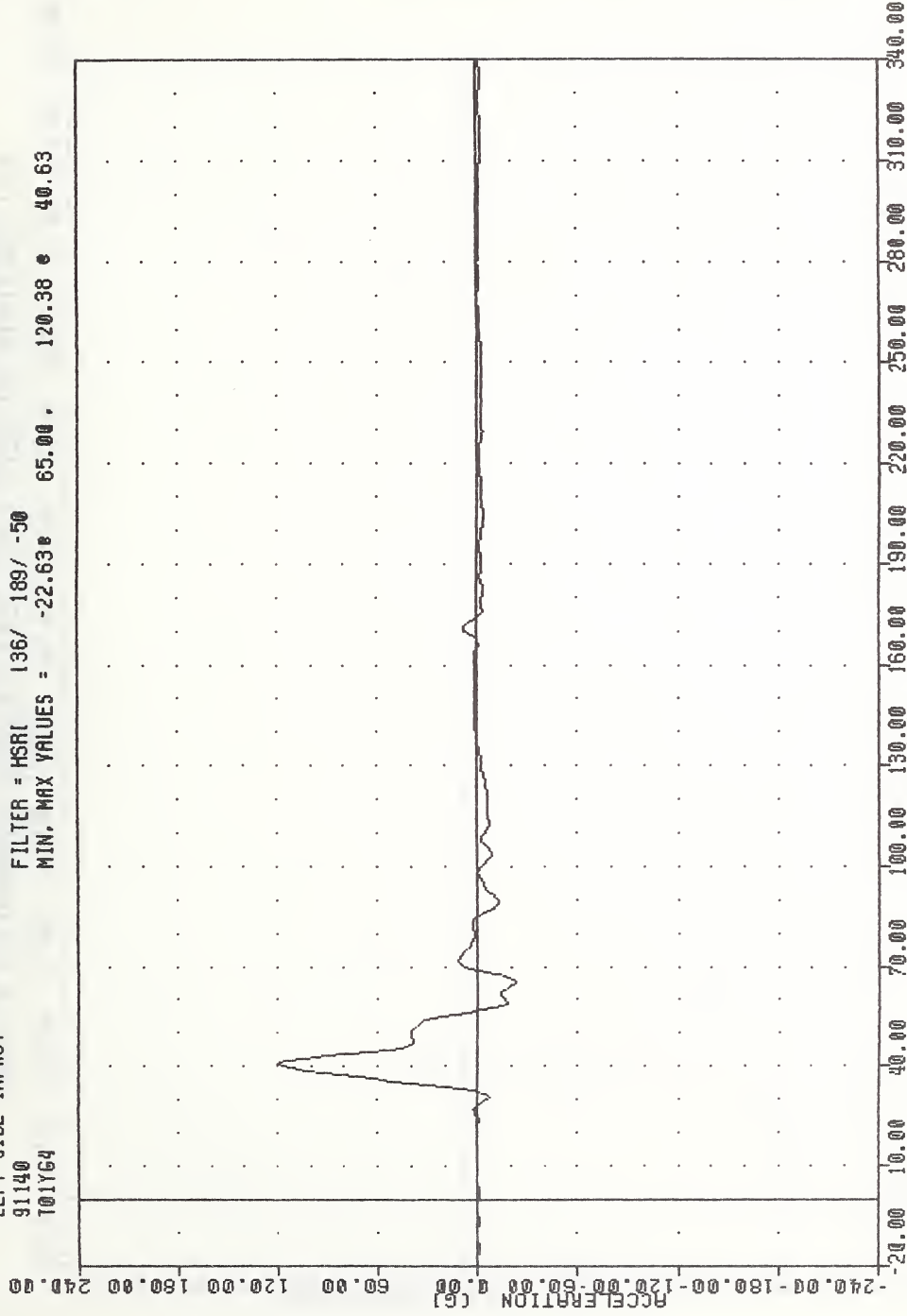
LEFT SIDE IMPACT

91140

T01Y64

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -22.63 65.00 120.38 40.63



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER UPPER SPINE Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

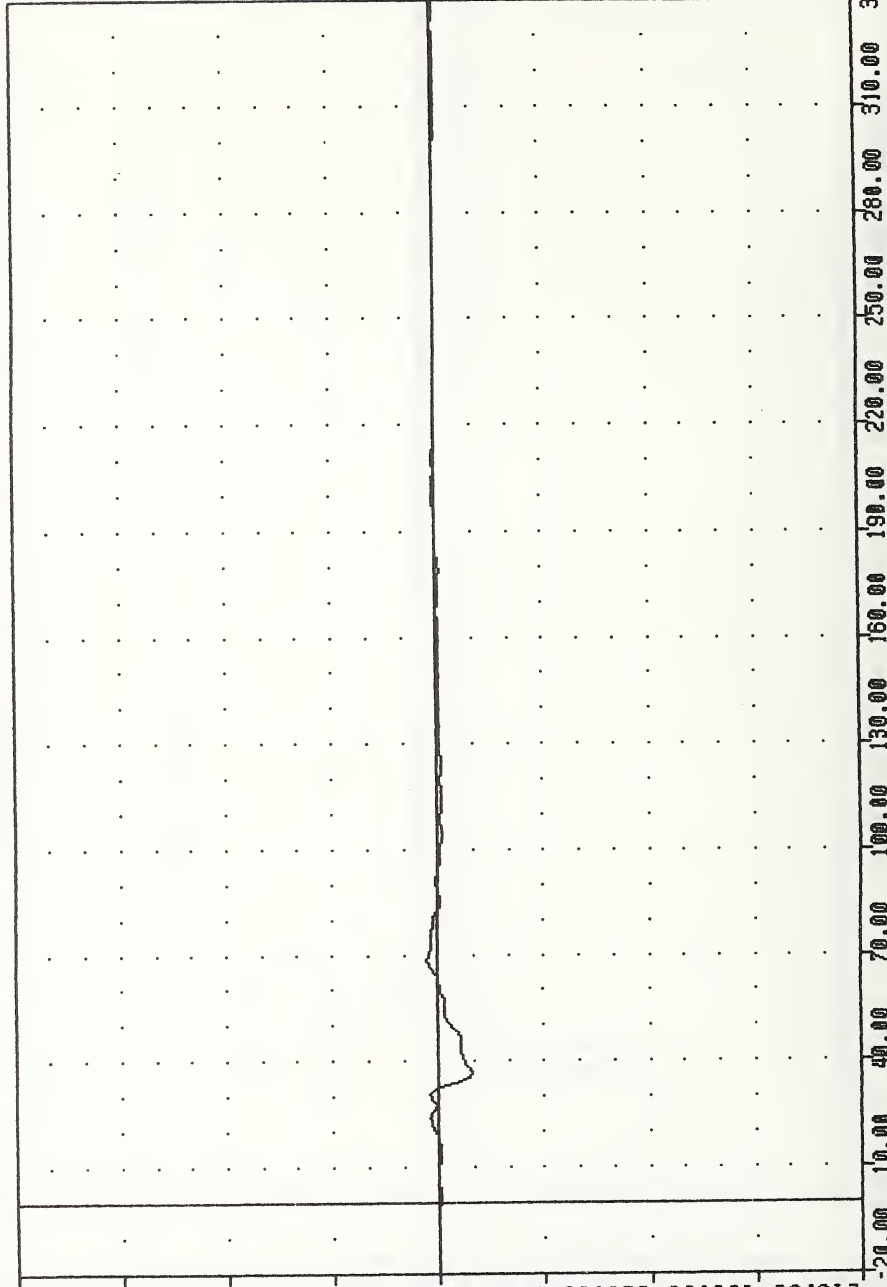
701764

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -18.66 36.88 ,

6.22 68.75

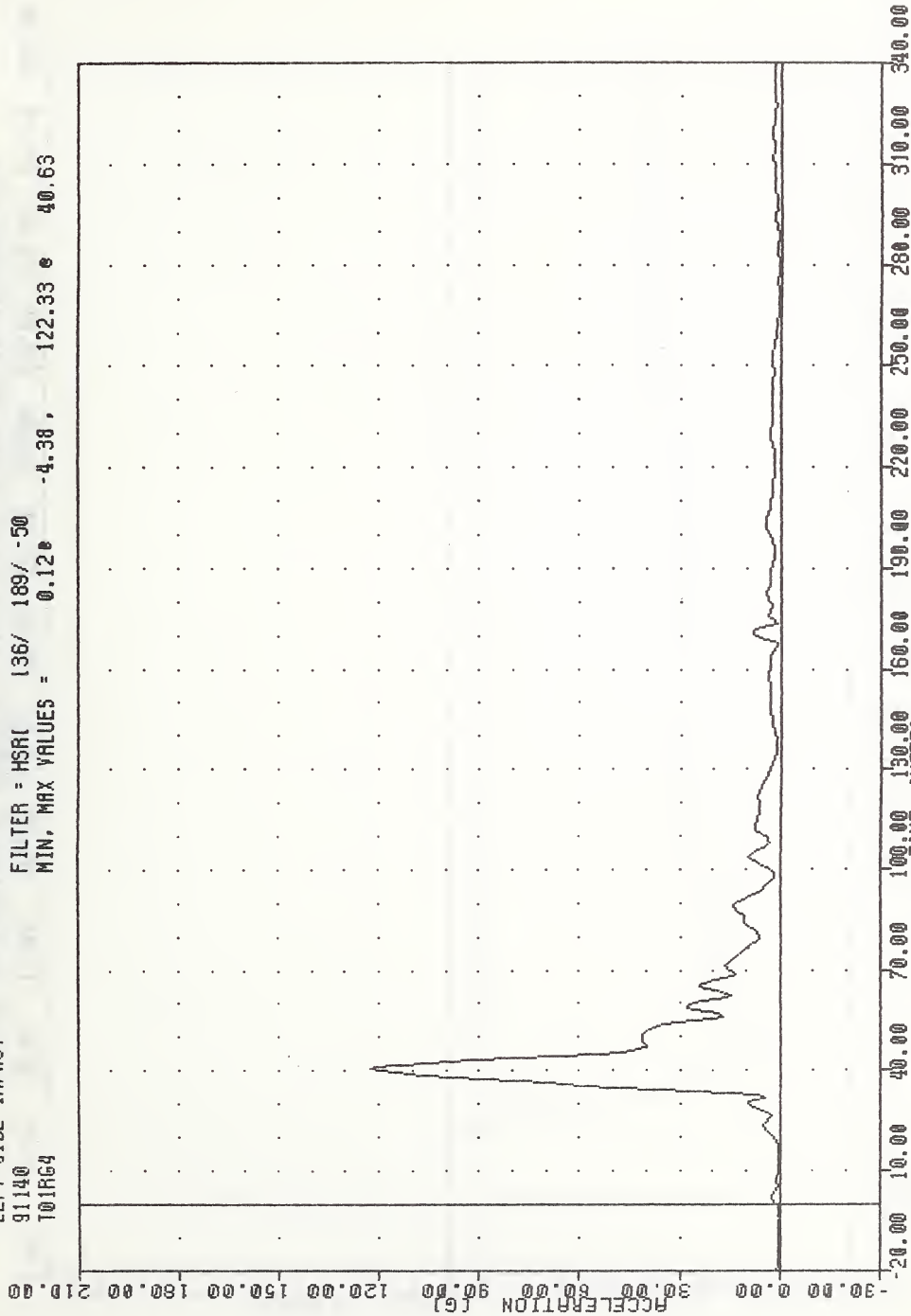
ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER UPPER SPINE Z-AXIS ACCELERATION

WRTC  
LEFT SIDE IMPACT  
91140  
T01RG4

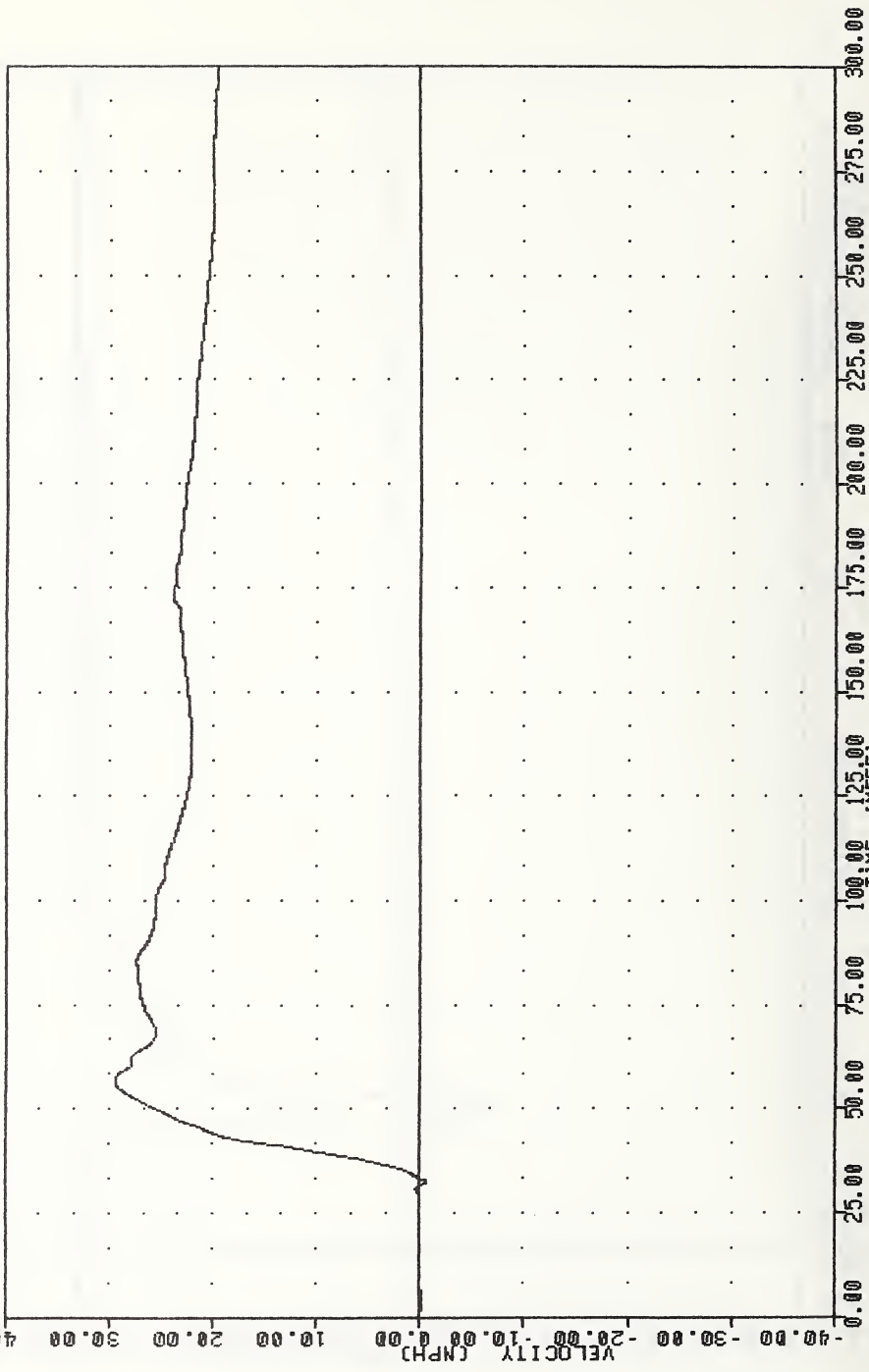
FILTER = HSRI 136/ 189/ -50  
MIN, MAX VALUES = 0.12e -4.38 , 122.33 e 40.63



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER UPPER SPINE RESULTANT ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
T01YV4

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -0.67 32.38 , 29.38 e 56.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER UPPER SPINE Y-AXIS VELOCITY

VRTC , 910520

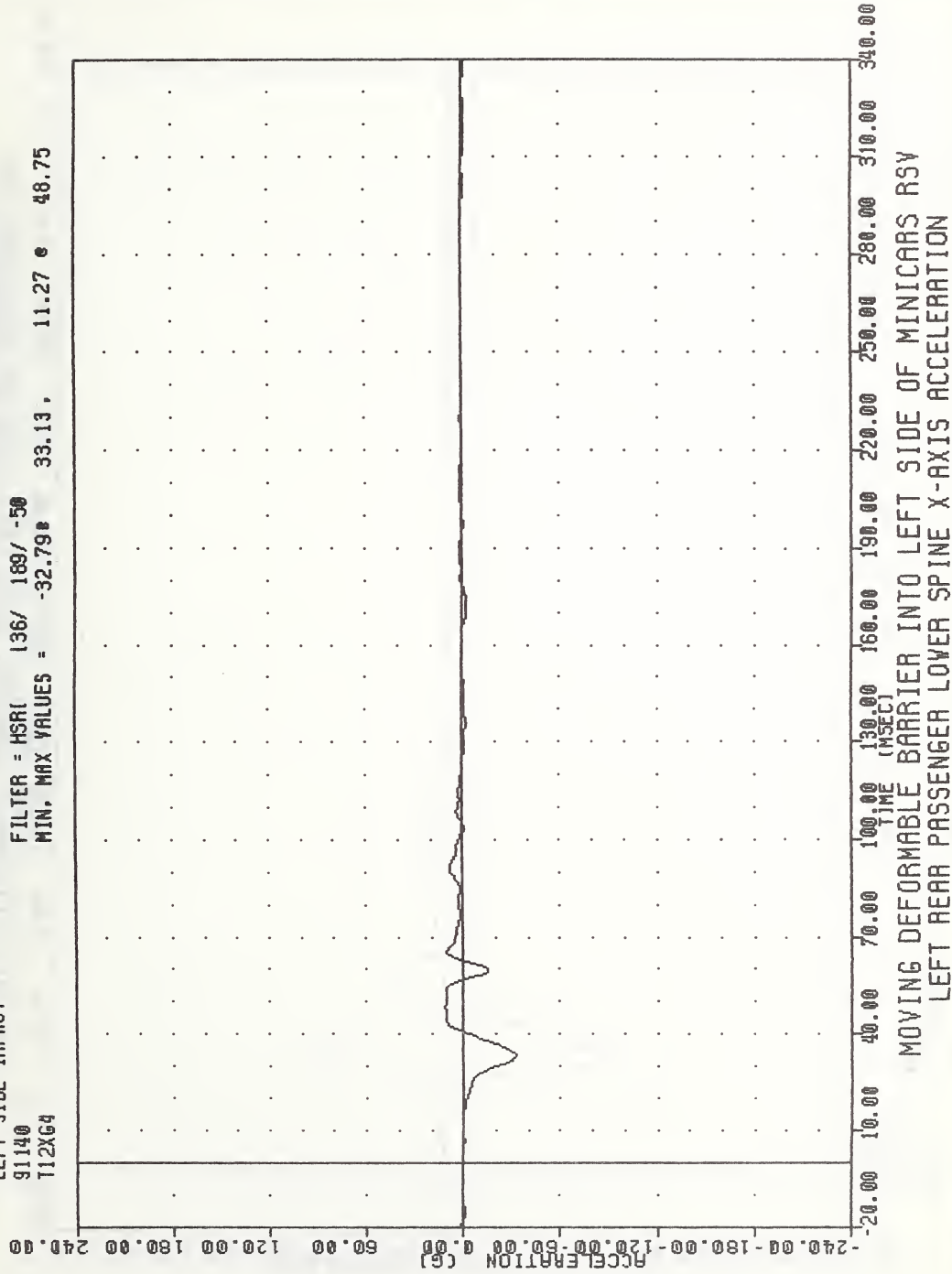
LEFT SIDE IMPACT

91140

712XG4

FILTER = HSR( 136/ 169/ -50

MIN. MAX VALUES = -32.79# 33.13, 11.27 # 48.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE X-AXIS ACCELERATION



NRIC , 910520

LEFT SIDE IMPACT

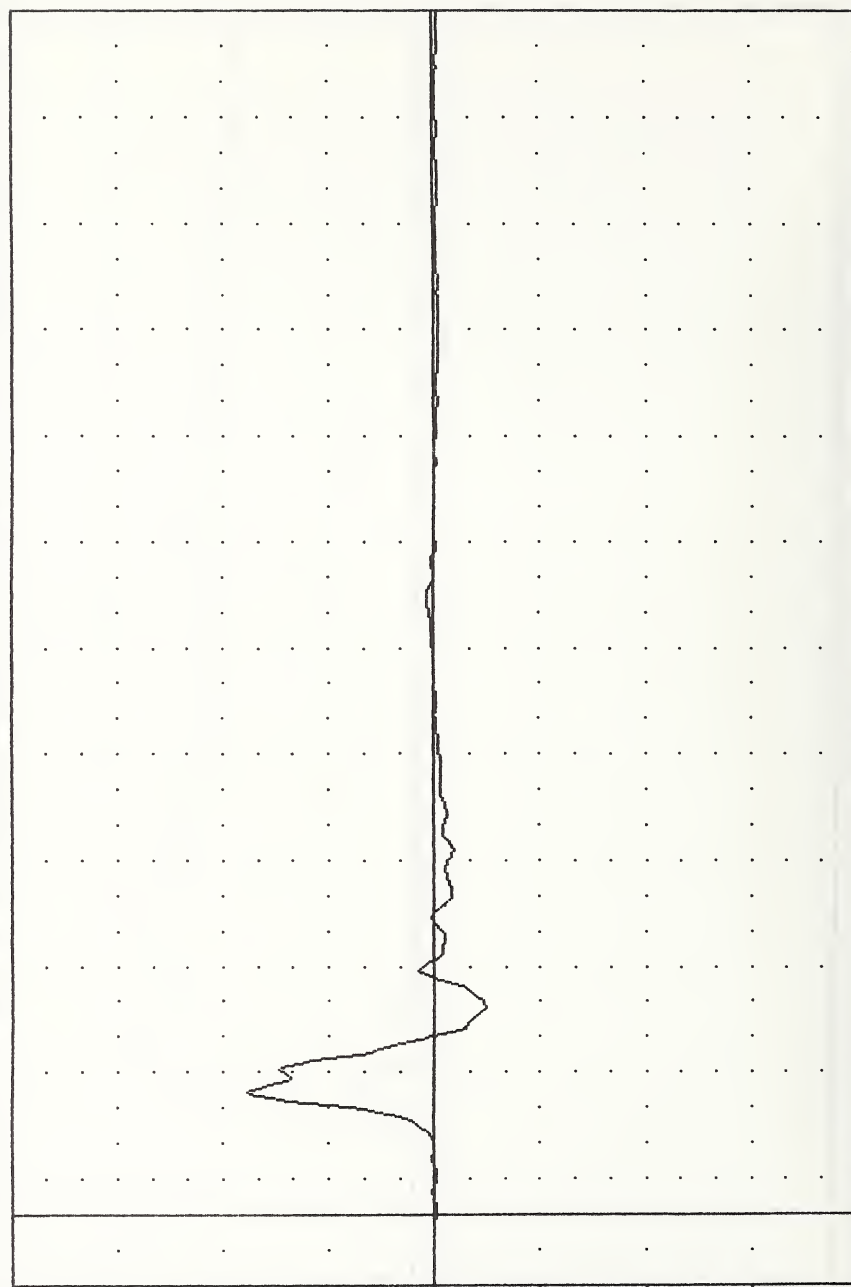
91140

112Y64

FILTER = HSR( 136/ 189/ -50

MIN, MAX VALUES = -28.90e 58.75, 106.01 e 34.38

ACCELERATION (G)



240.00 180.00 120.00 60.00 0.00 60.00 120.00 180.00 240.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

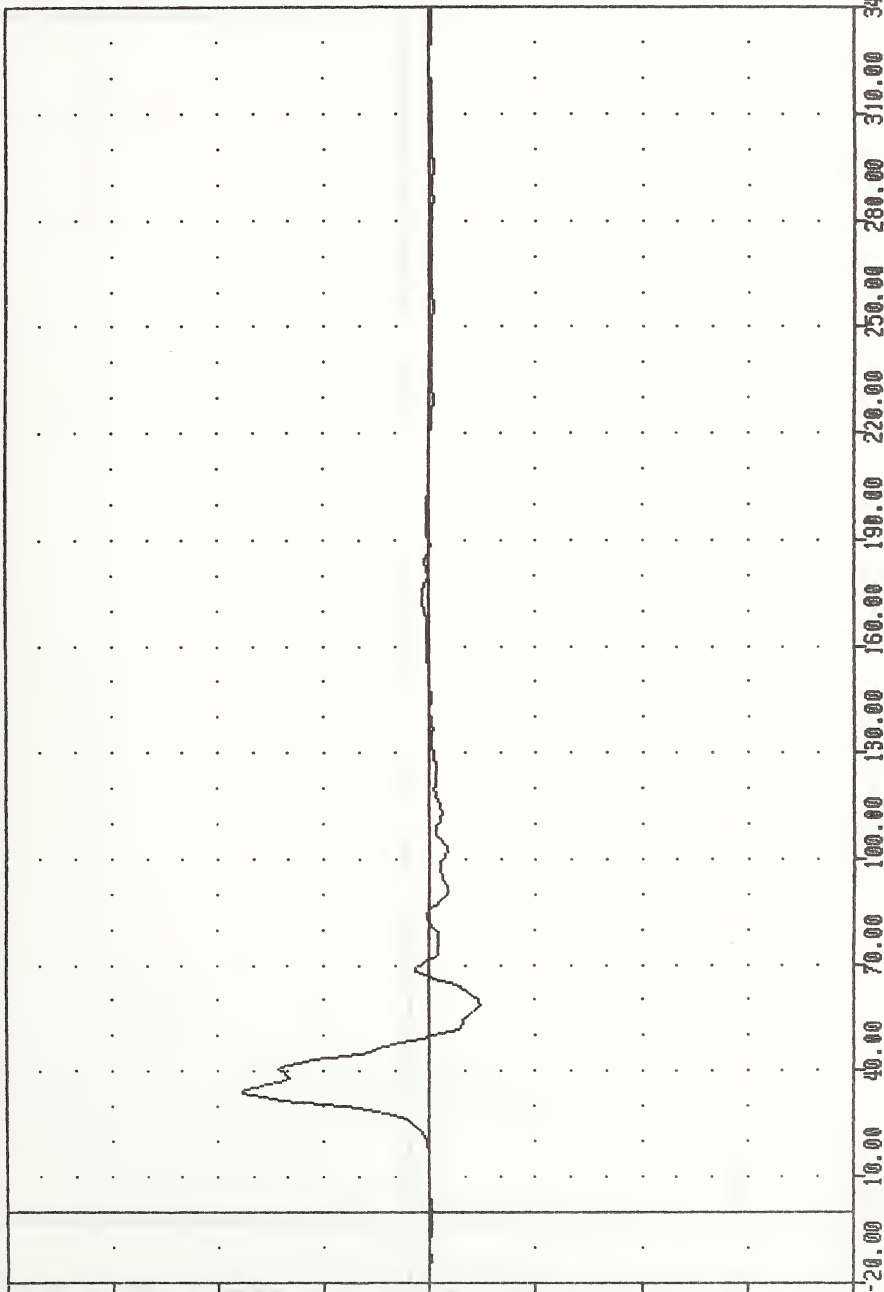
91140

112Y60

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -28.63 58.75 , 106.51 34.38

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE Y-AXIS REDUNDANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

712764

FILTER = HSR1 136/ 189/ -50

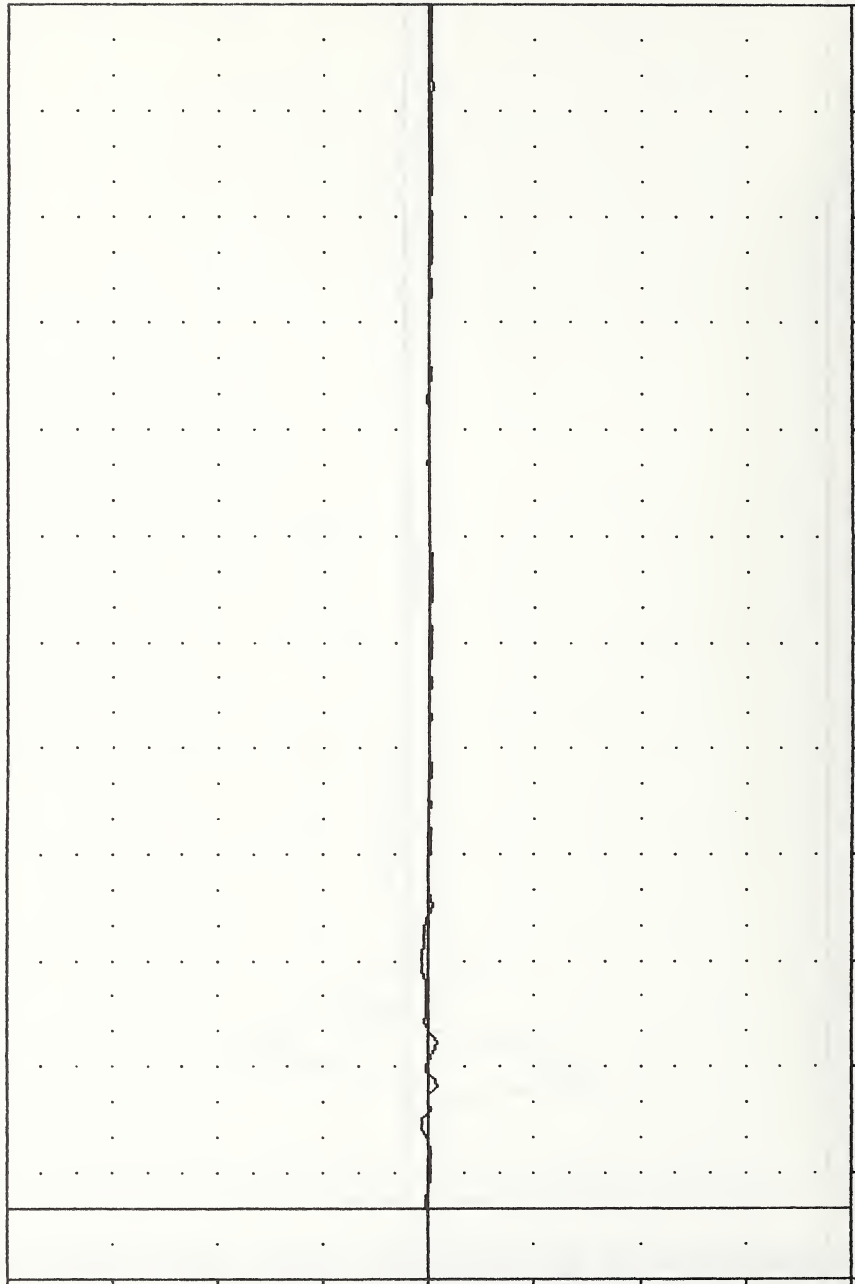
MIN. MAX VALUES = -4.57 e

35.00 ,

4.57 e

68.75

ACCELERATION (G)



20.00 10.00 0.00 60.00 120.00 180.00 240.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE Z-AXIS ACCELERATION

VRTC , 910520

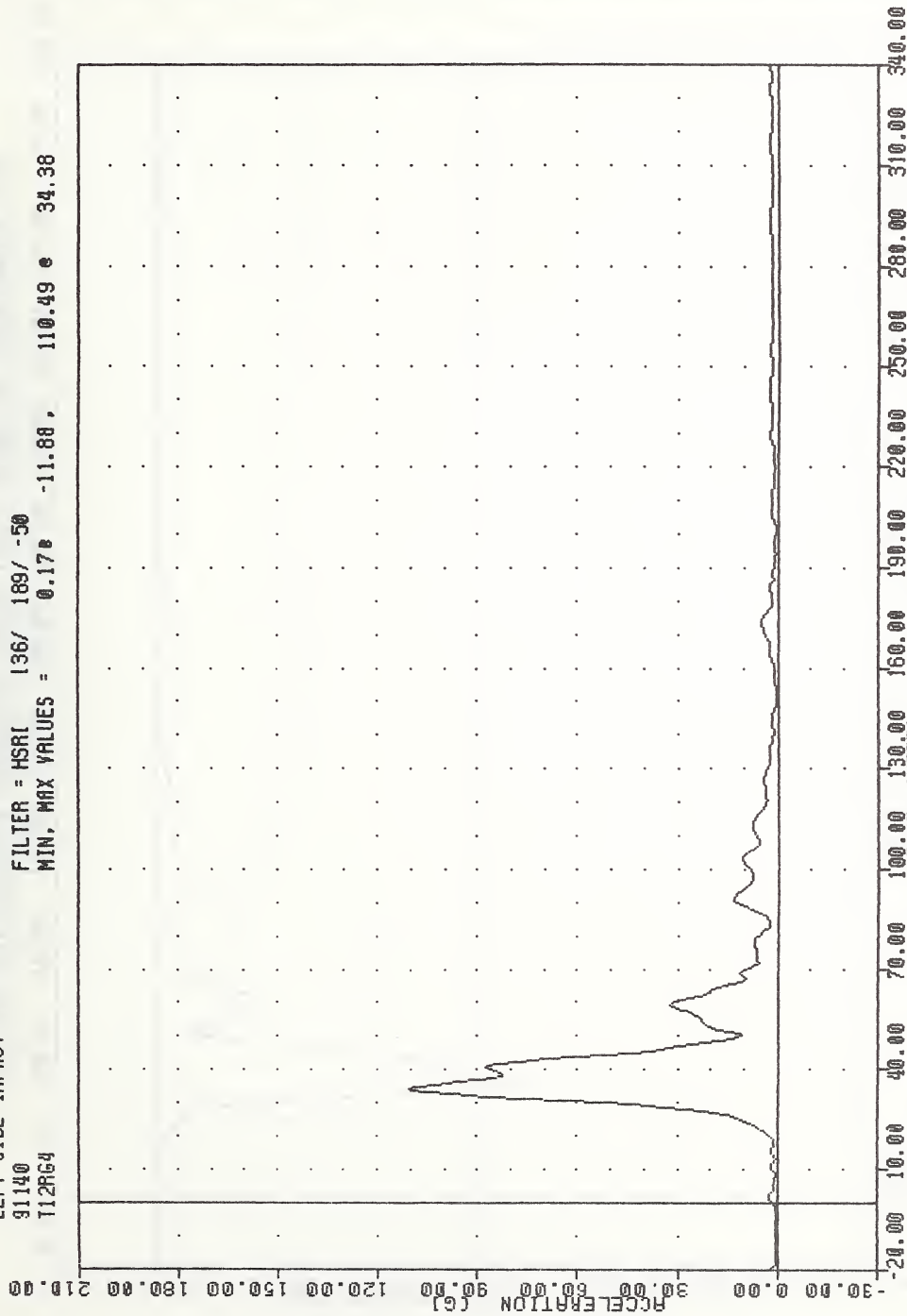
LEFT SIDE IMPACT

91140

T12R64

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = 0.17e -11.88 , 110.49 e 34.38

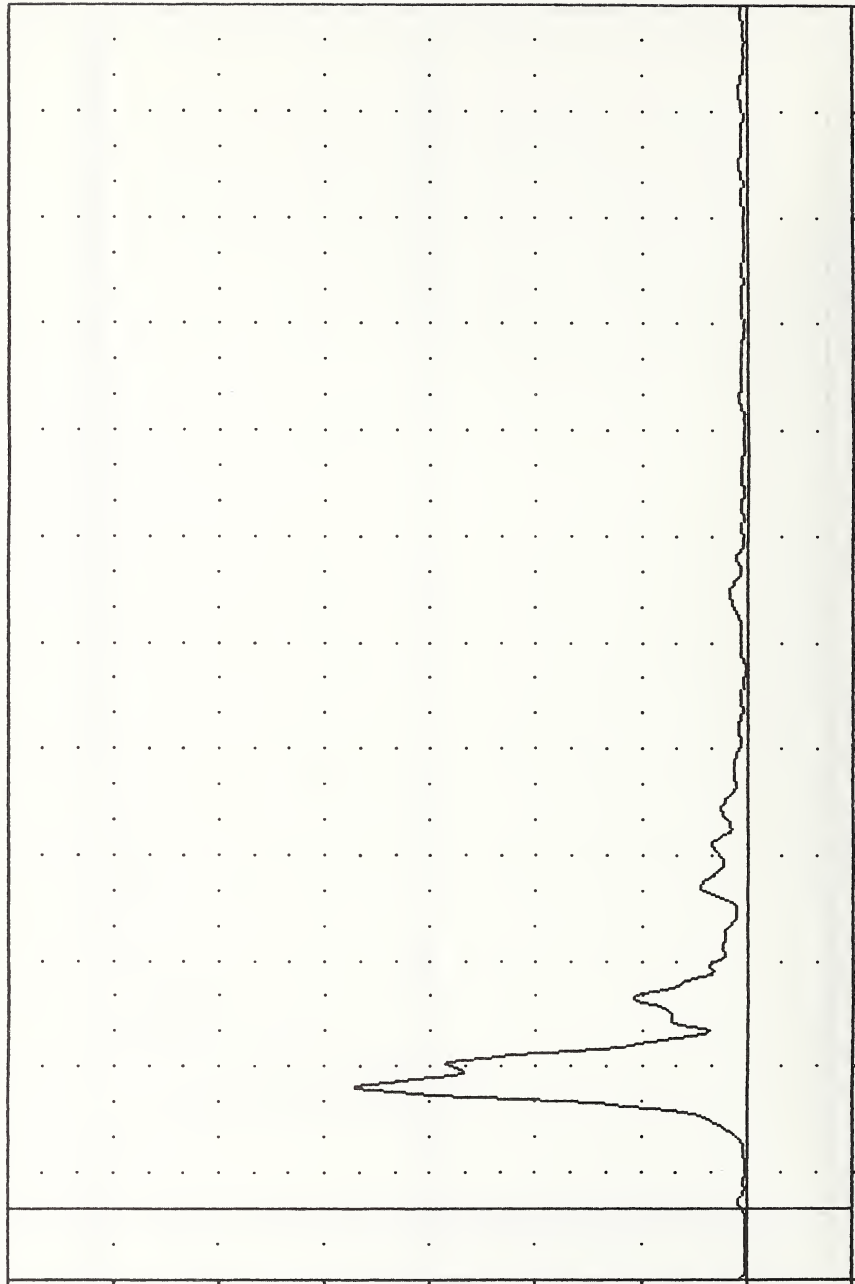


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE RESULTANT ACCELERATION

VRTC  
LEFT SIDE IMPACT  
91140  
712R60

FILTER = HSRI 136/ -50  
MIN, MAX VALUES = 0.20e -18.13, 110.97 e 33.75

ACCELERATION (G)



TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE REDUNDANT RESULTANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

112TV4

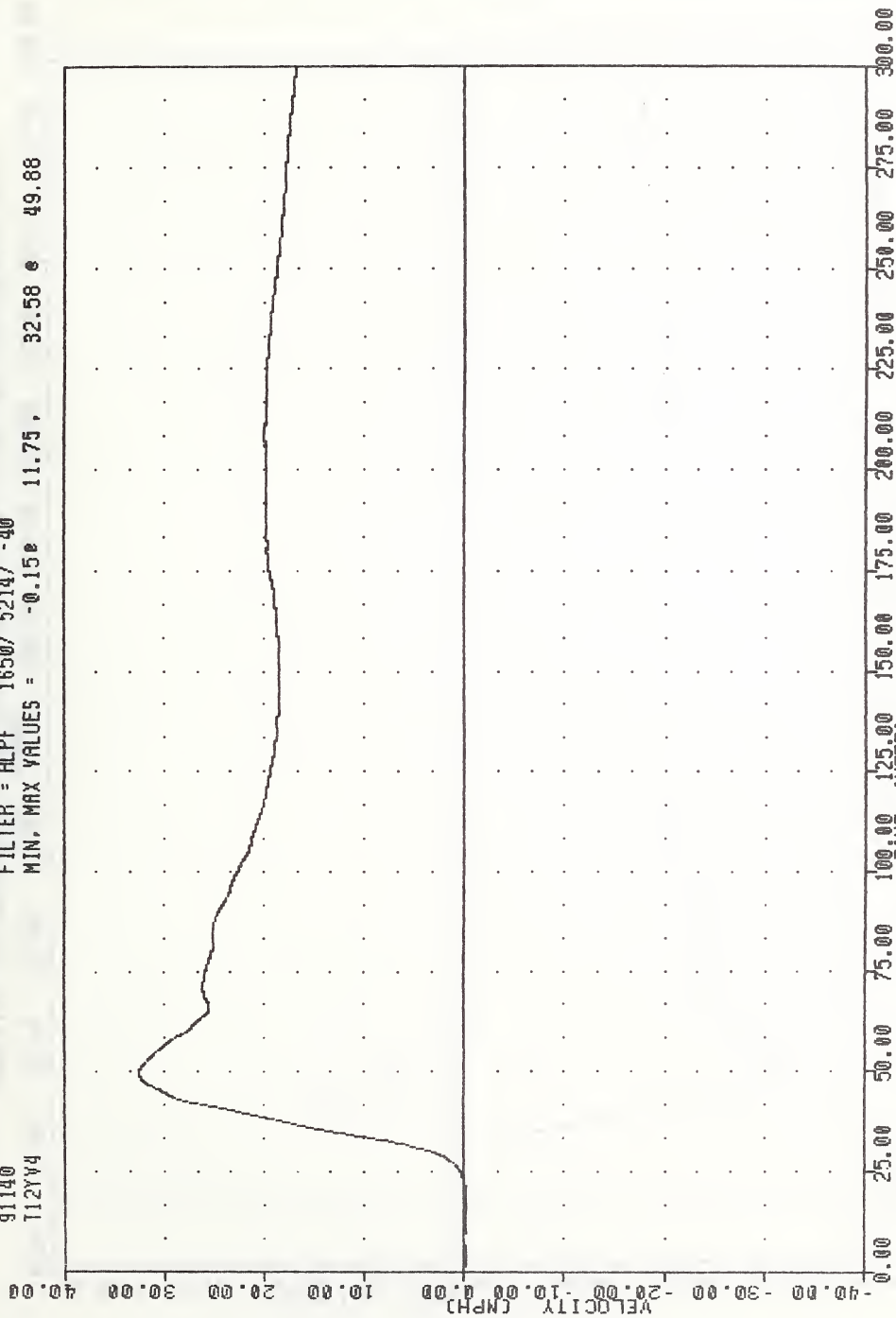
FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.15e

11.75 ,

32.58 e

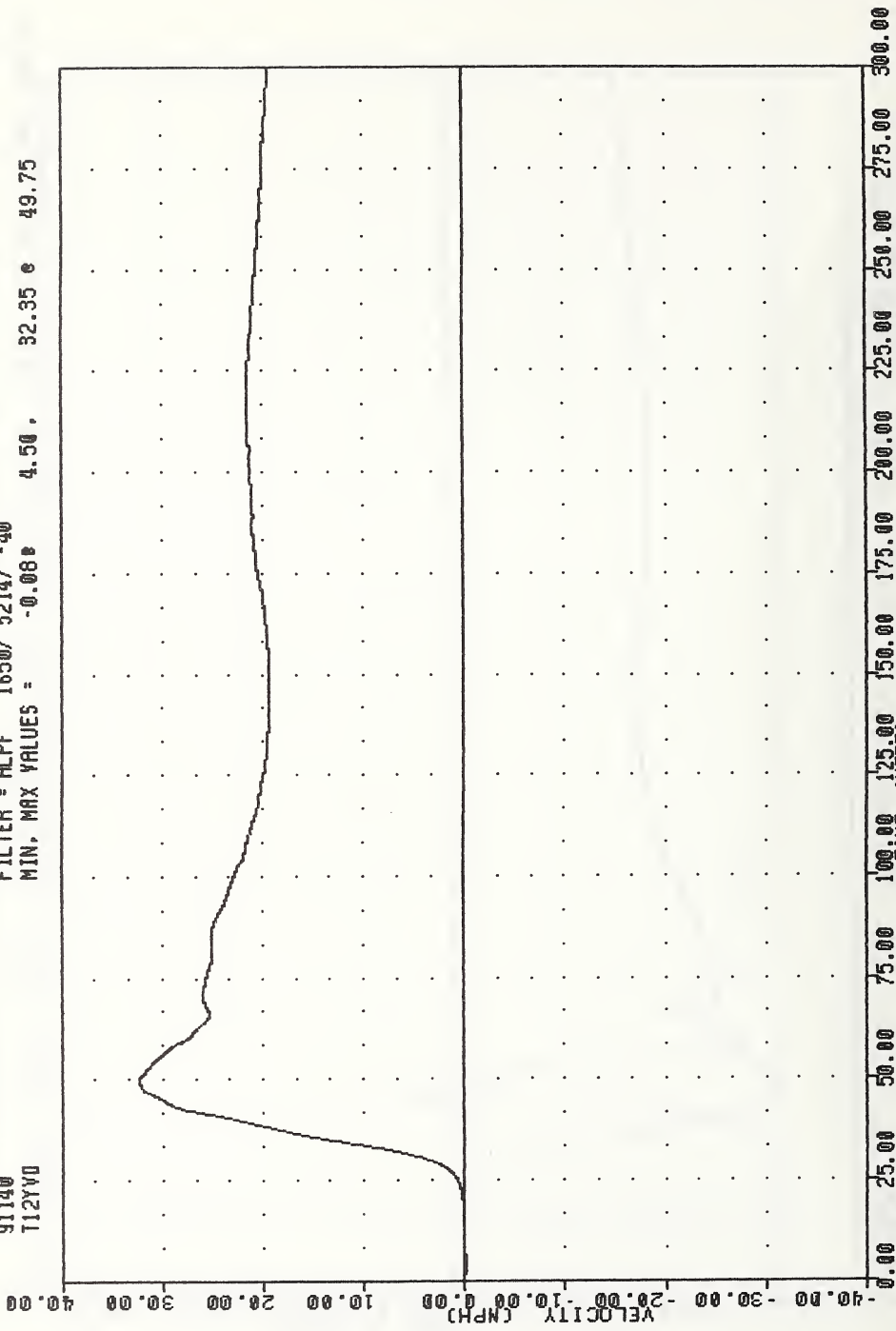
49.88



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE Y-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
712YVD

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -0.08 4.50 , 32.35 49.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LOWER SPINE Y-AXIS REDUNDANT VELOCITY



VRTC , 910520

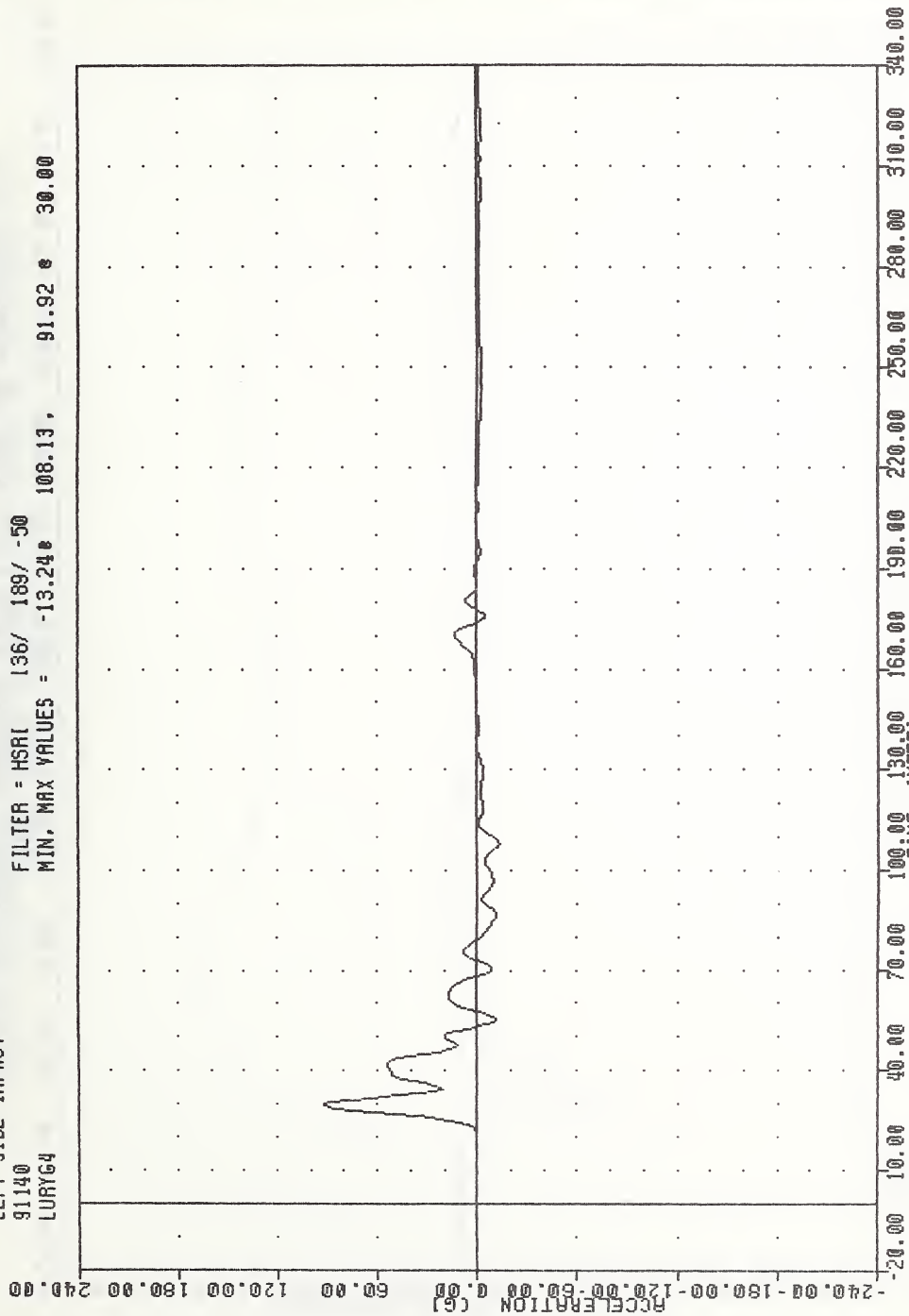
LEFT SIDE IMPACT

91140

LURY64

FILTER = HSRI 136/ 189/ -50

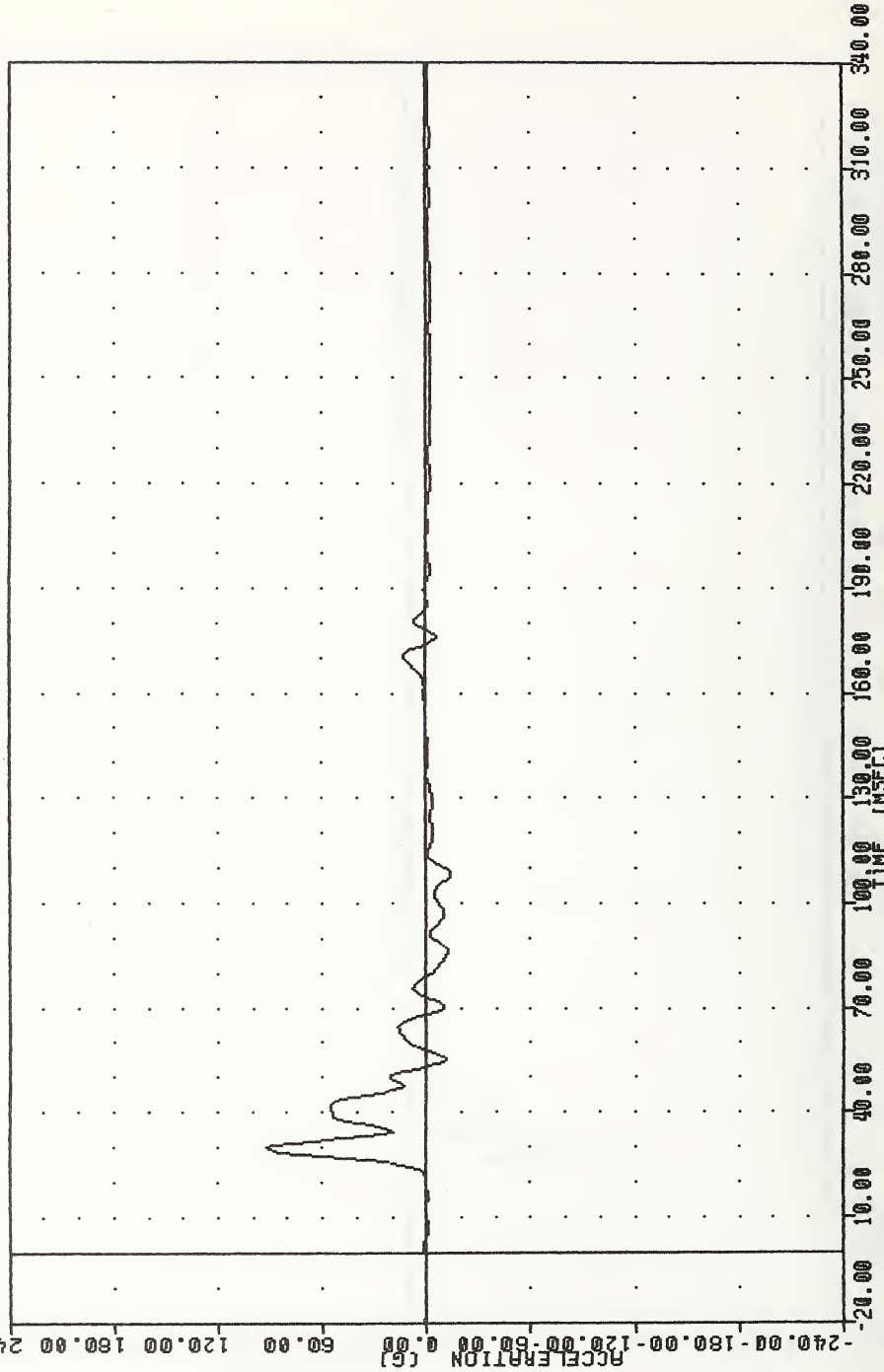
MIN. MAX VALUES = -13.24 108.13 , 91.92 30.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LURY60

FILTER = HSRI 136/ 189/ -50  
MIN. MAX VALUES = -13.70e 108.13 , 92.06 e 30.00

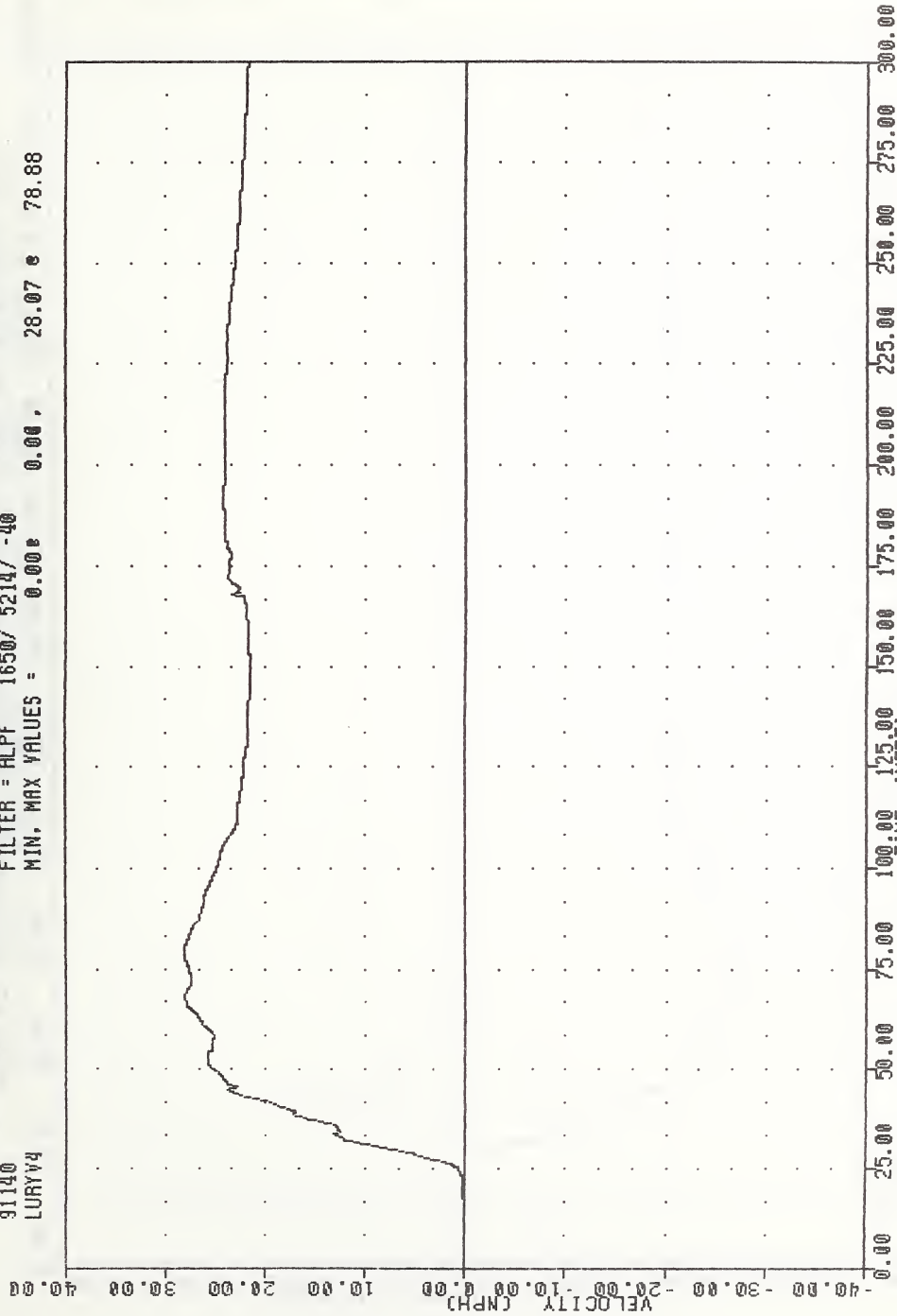


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LURYV4

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.00 0.00

28.07 e 78.88



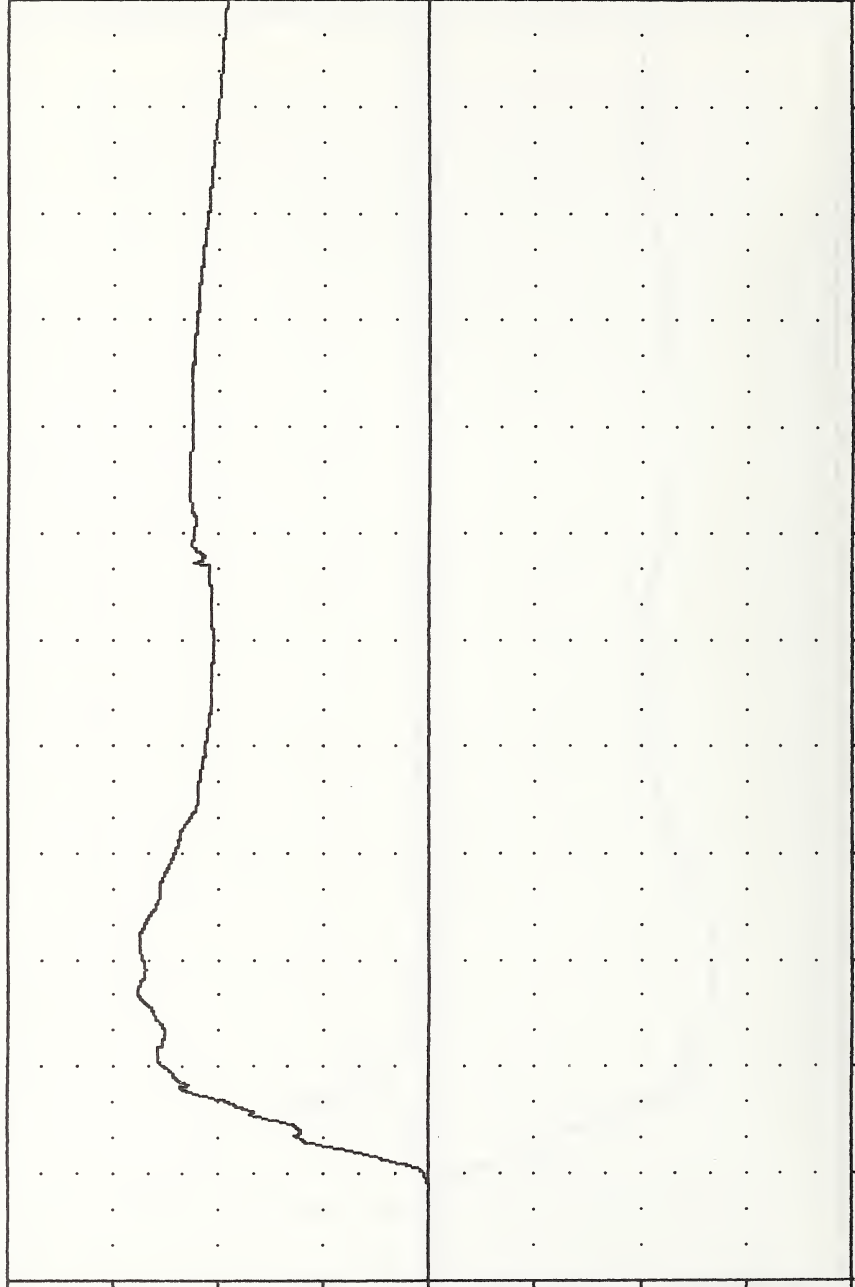
MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LURIYD

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = 0.00e 0.25 , 27.59 e 68.25

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00  
VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00  
TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT UPPER THORAX RIB Y-AXIS REDUNDANT VELOCITY

VRTC . 910520

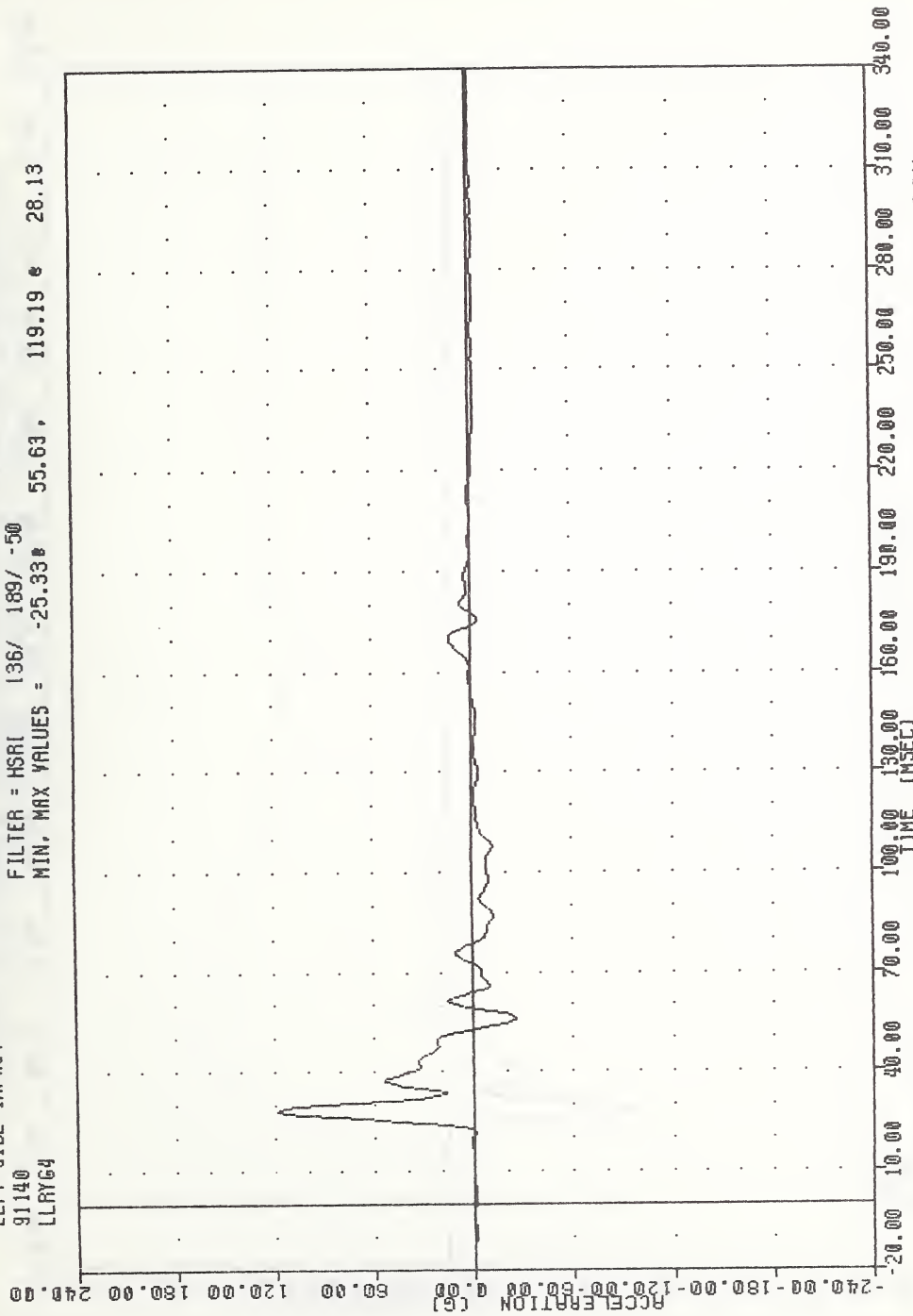
LEFT SIDE IMPACT

91140

LLRY64

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = -25.33 55.63, 119.19 28.13



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT LOWER THORAX RIB Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

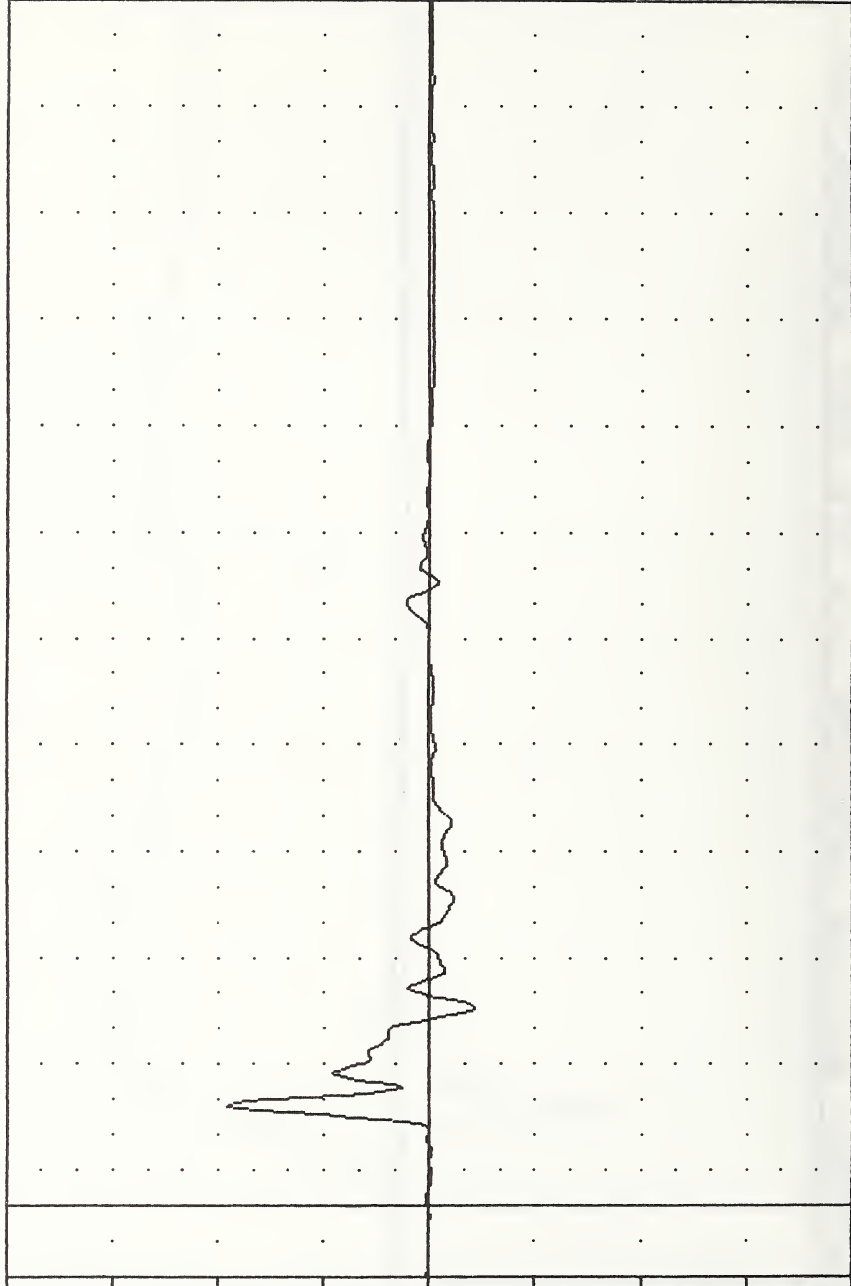
91140

LLAY60

FILTER = HSR1 136/ 189/ -50

MIN. MAX VALUES = -25.27 55.63, 114.89 28.13

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

LLRYV4

FILTER = ALPF 1650/ 5214/ -40

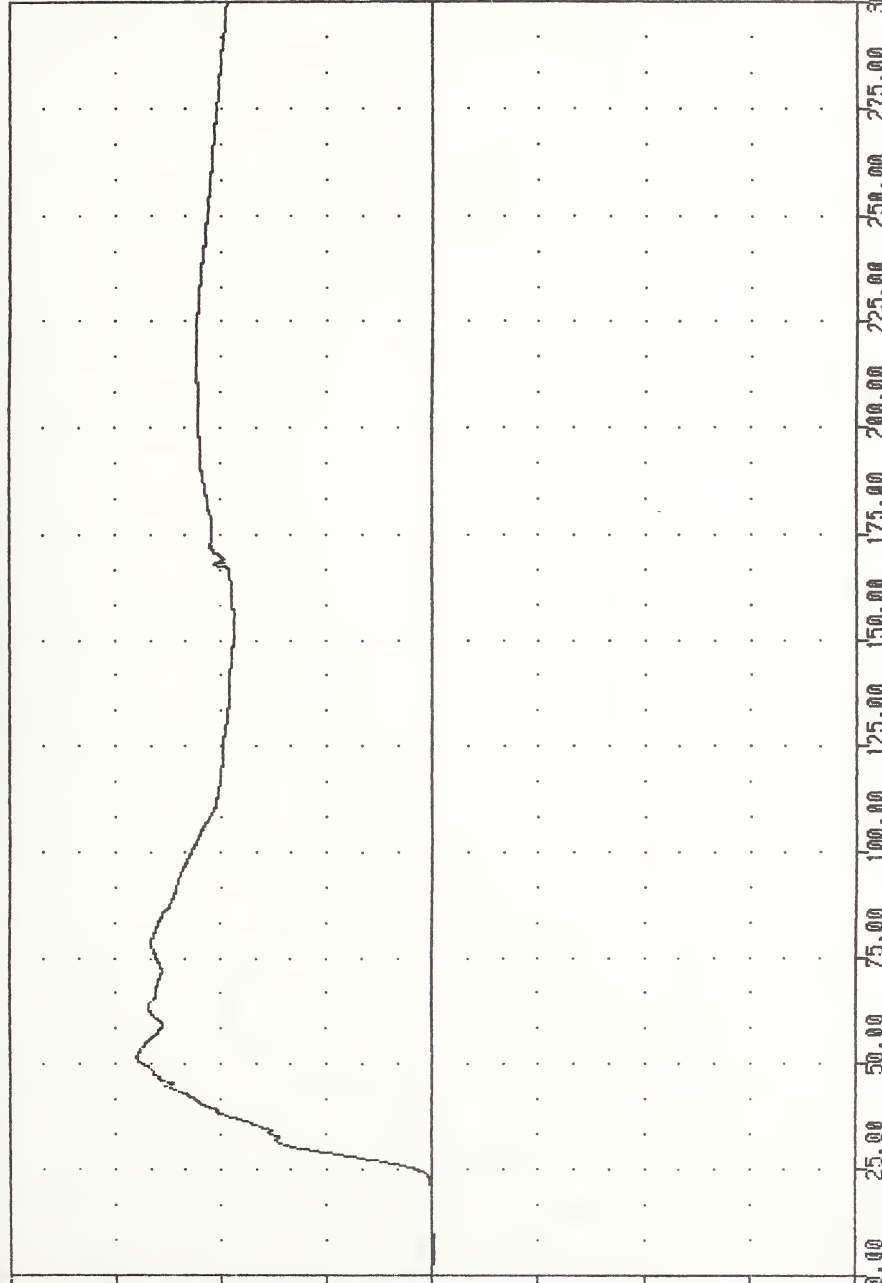
MIN. MAX VALUES = -0.10e

5.38 ,

28.05 e

51.63

VELOCITY (MPH)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT LOWER THORAX AIB Y-AXIS VELOCITY



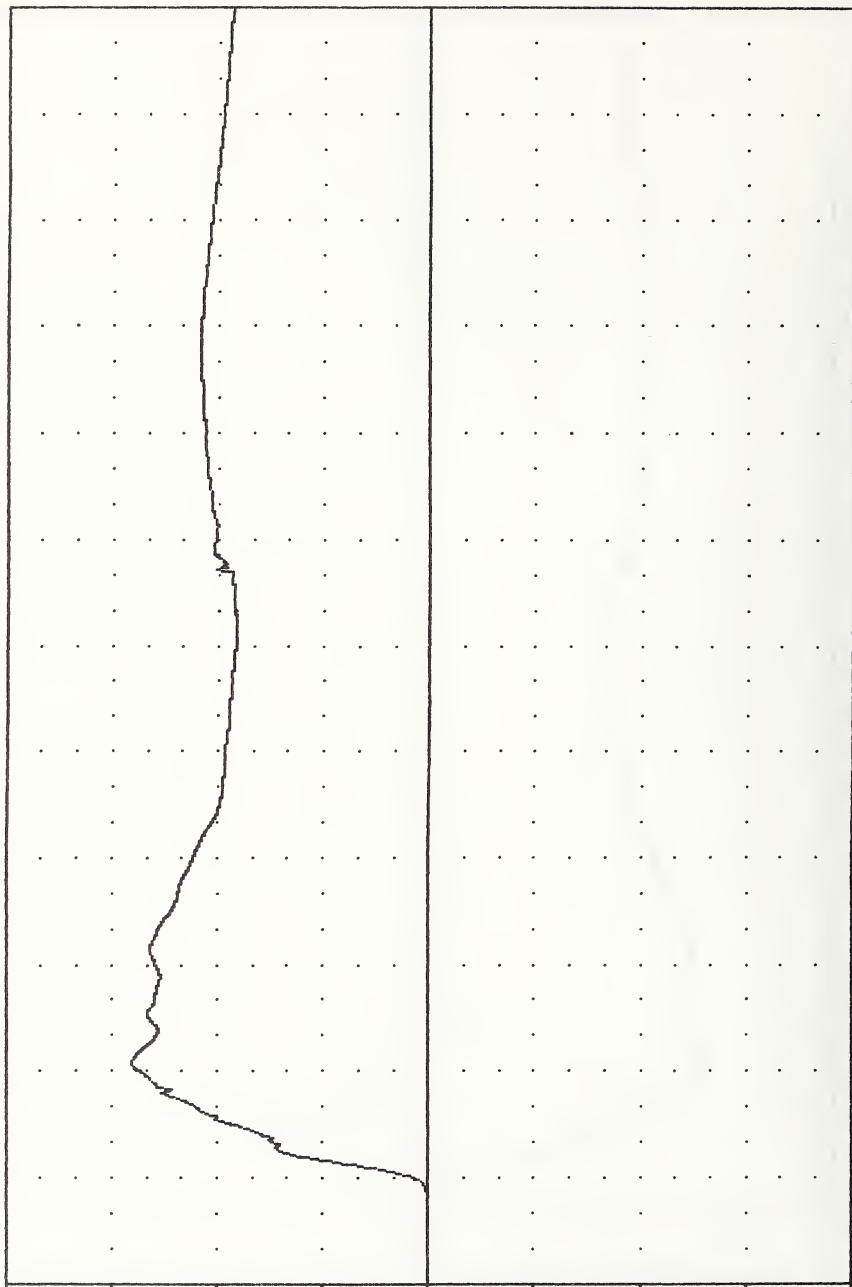
VRTC , 910520  
LEFT SIDE IMPACT  
91140  
LLRYV0

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = -0.018 0.50 ,

28.13 e 51.63

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00

VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER LEFT LOWER THORAX RIB Y-AXIS REDUNDANT VELOCITY

VRTC .910520

LEFT SIDE IMPACT

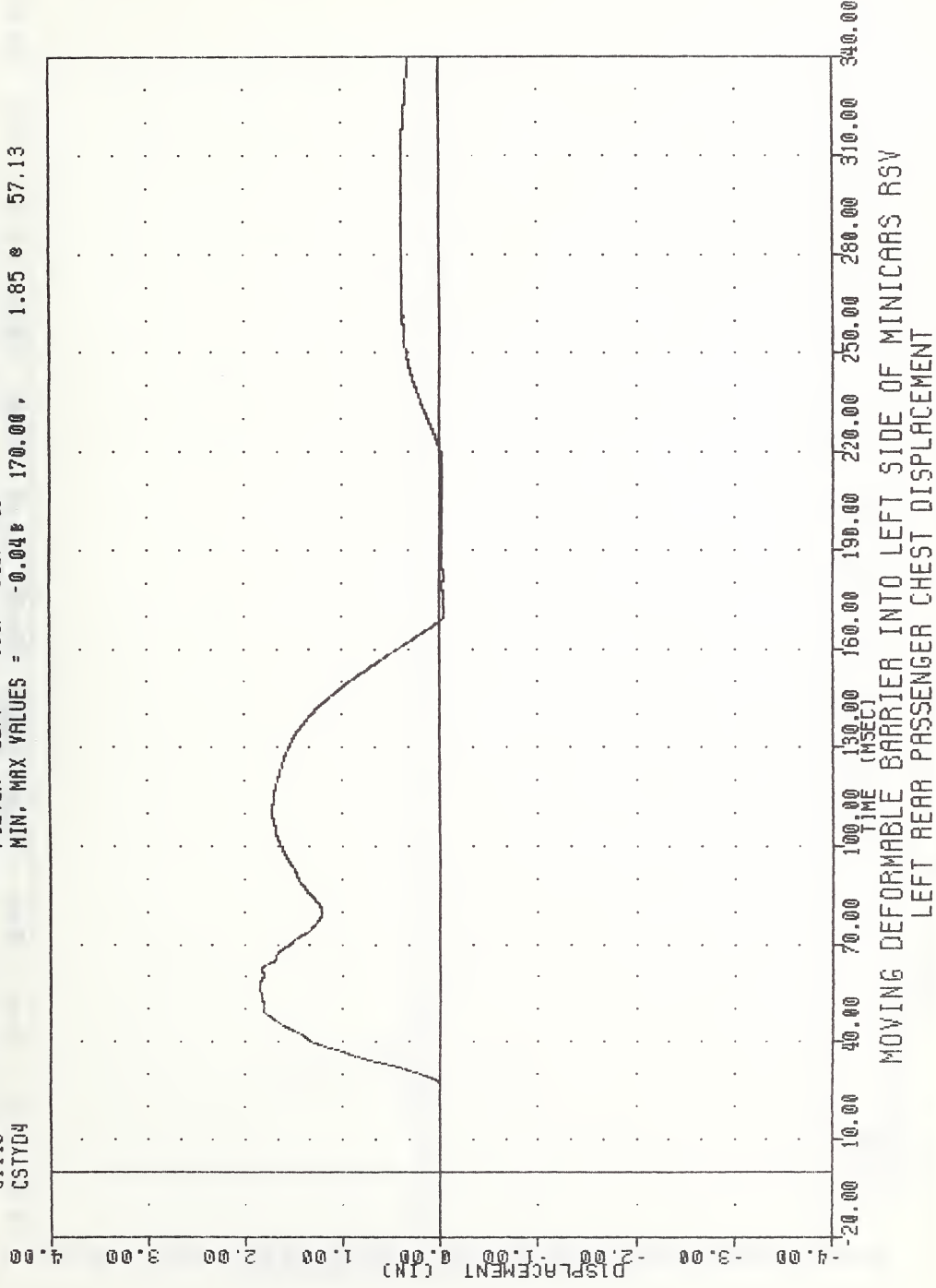
91140

CSTD4

FILTER = BLPF 300/ 949/ -40

MIN, MAX VALUES = -0.048 170.00 ,

1.85 e 57.13



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER CHEST DISPLACEMENT

VRTC , 910520

LEFT SIDE IMPACT

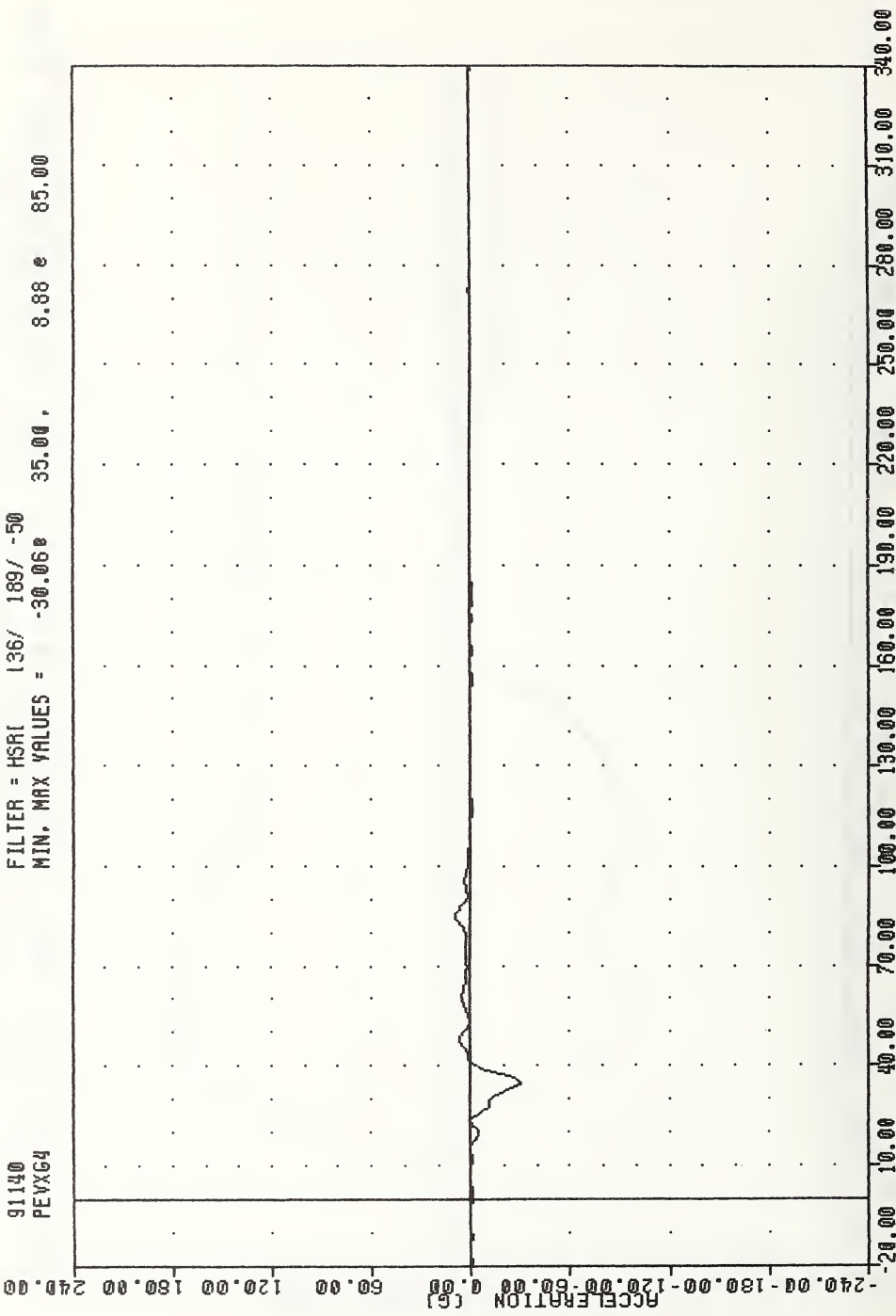
91140

PEVXG4

FILTER = HSA( 136/ 189/ -50

MIN. MAX VALUES = -30.06 35.00 ,

8.88 e 85.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER PELVIS X-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

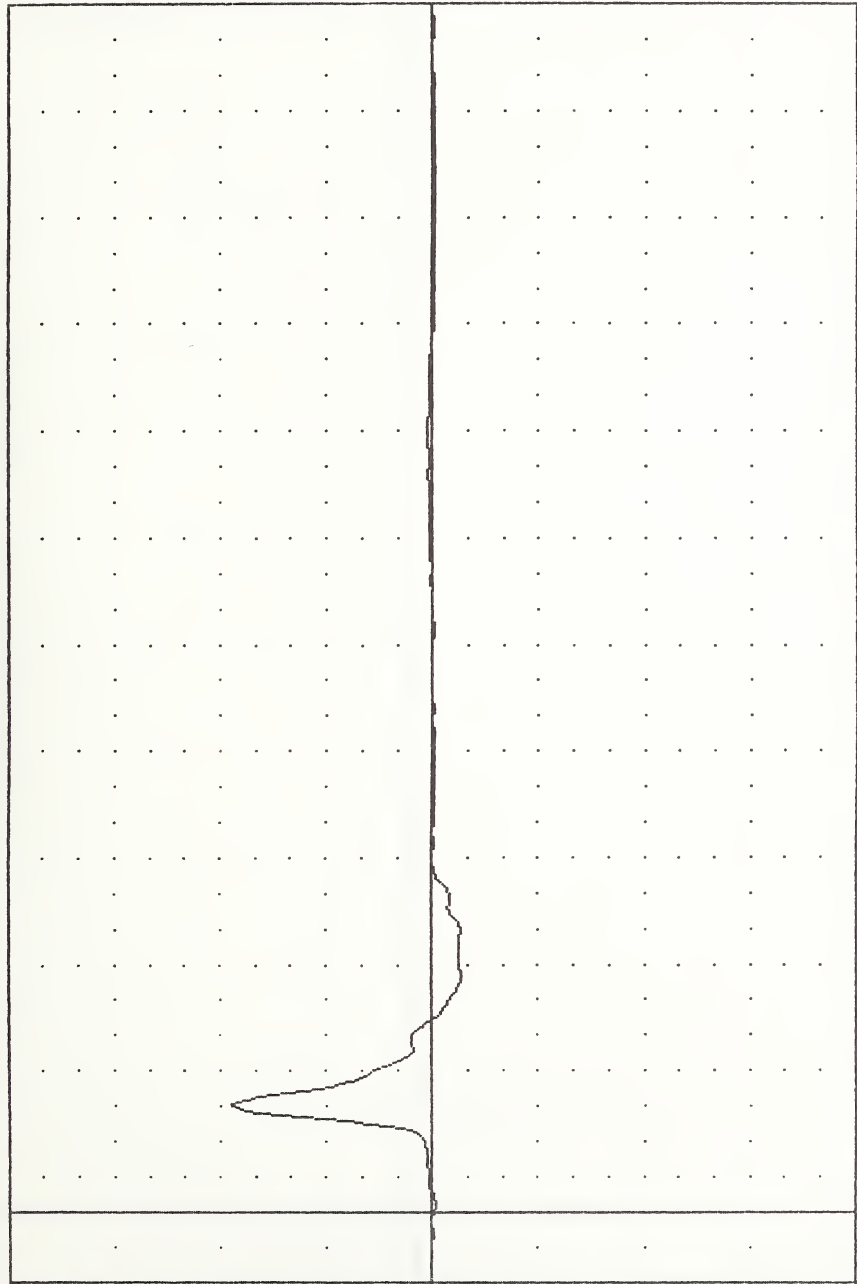
91140

PEVY64

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = -16.10e 80.00 , 113.73 e 30.00

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER PELVIS Y-AXIS ACCELERATION

VRTC , 910520

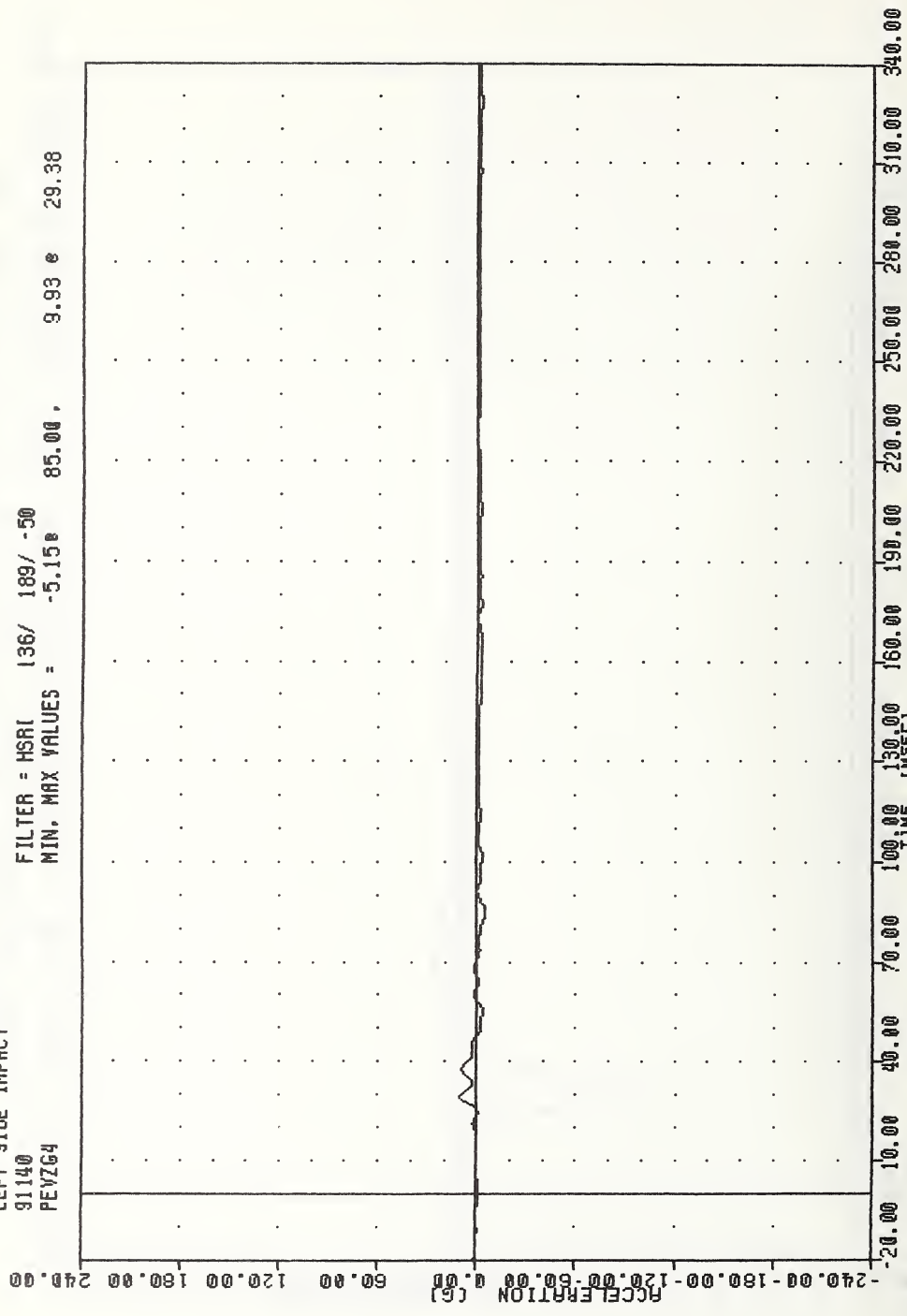
LEFT SIDE IMPACT

91140

PEVZG4

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -5.15e 85.00 ,

9.93 e 29.38



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
LEFT REAR PASSENGER PELVIS Z-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

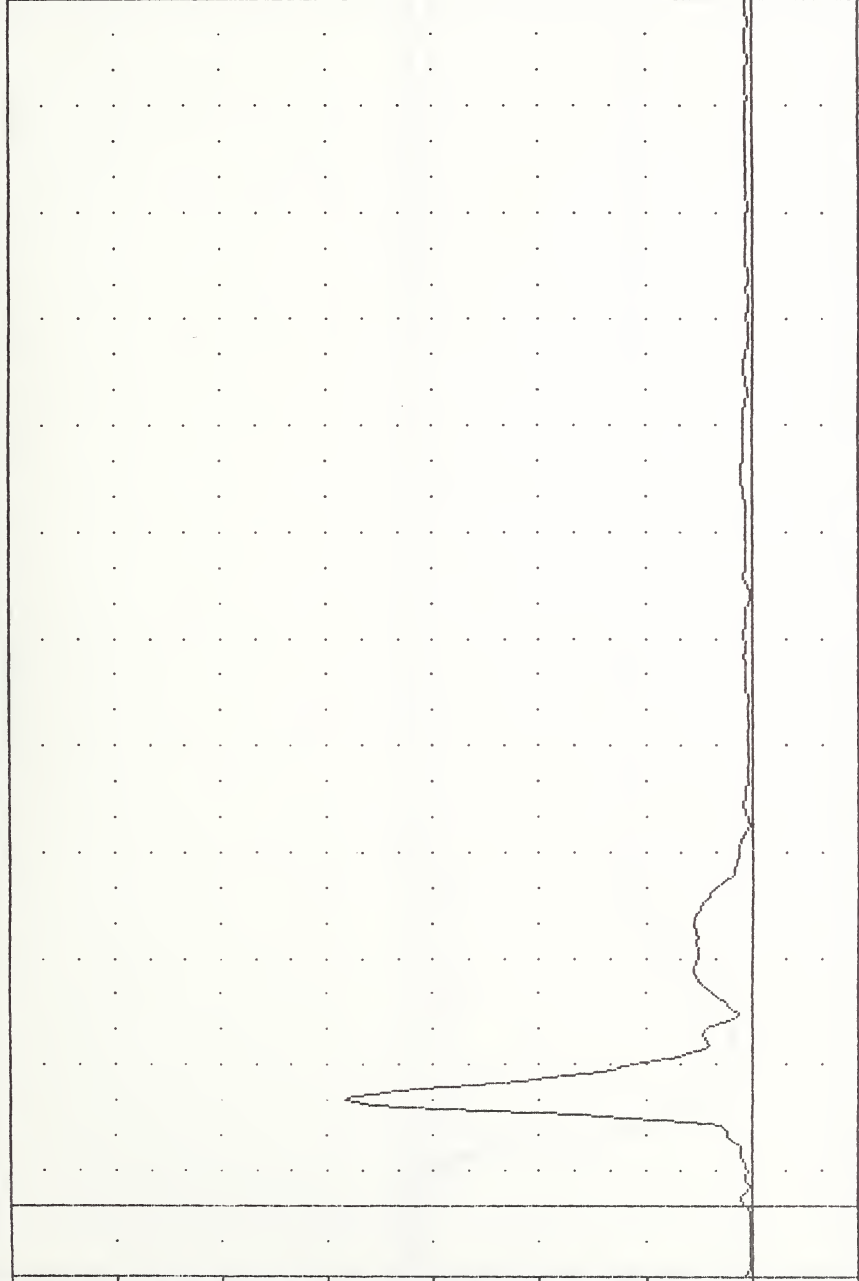
91140

PEVRG4

FILTER = HSRI 136/ 189/ -50

MIN. MAX VALUES = 0.14 g -16.87 , 114.77 g 30.00

ACCELERATION (G)



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

LEFT REAR PASSENGER PELVIS RESULTANT ACCELERATION

VRTC . 910520

LEFT SIDE IMPACT

91140

PEVVV4

FILTER = ALPF 1850/ 5214/ -40

MIN. MAX VALUES = -0.228

4.63,

30.39 @

53.75

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

0.00

10.00

20.00

30.00

40.00

50.00

60.00

70.00

80.00

90.00

100.00

110.00

120.00

TIME  
(MSEC)

0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV

LEFT REAR PASSENGER PELVIS Y-AXIS VELOCITY

VRTC 910520  
LEFT SIDE IMPACT

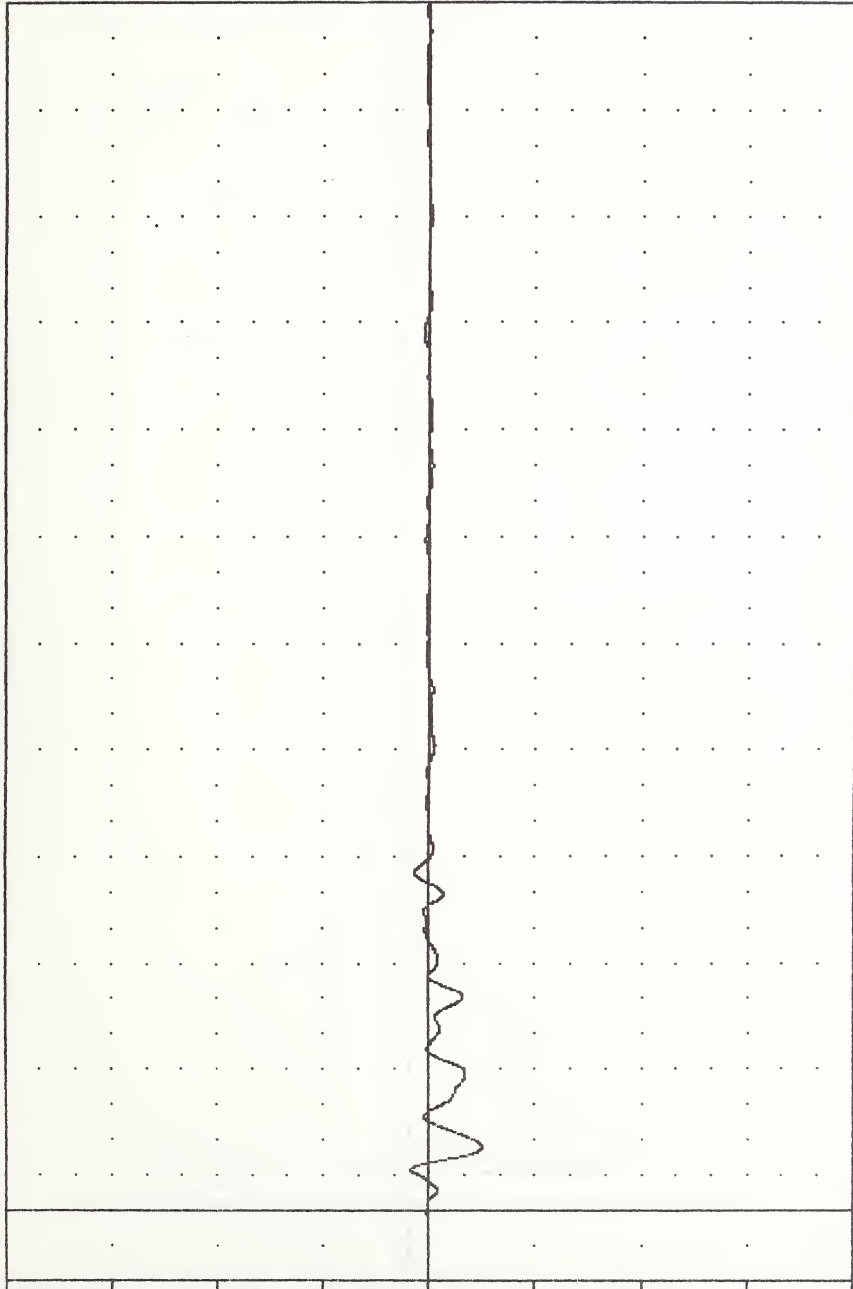
91140  
AFSXG

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -7.47e 18.00 ,

2.54 e 11.50

50.00  
45.00  
40.00  
35.00  
30.00  
25.00  
20.00  
15.00  
10.00  
5.00  
0.00  
-5.00  
-10.00  
-15.00  
-20.00  
-25.00  
-30.00  
-35.00  
-40.00  
-45.00  
-50.00

ACCELERATION (G)



20.00 30.00 40.00 50.00 60.00 70.00 80.00 90.00 100.00 110.00 120.00 130.00 140.00 150.00 160.00 170.00 180.00 190.00 200.00 210.00 220.00 230.00 240.00 250.00 260.00 270.00 280.00 290.00 300.00 310.00 320.00 330.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT FRONT SILL X-AXIS ACCELERATION



VRTC - 910520

LEFT SIDE IMPACT

91140

RFSYG

FILTER = BLPF 100/ 316/ -40

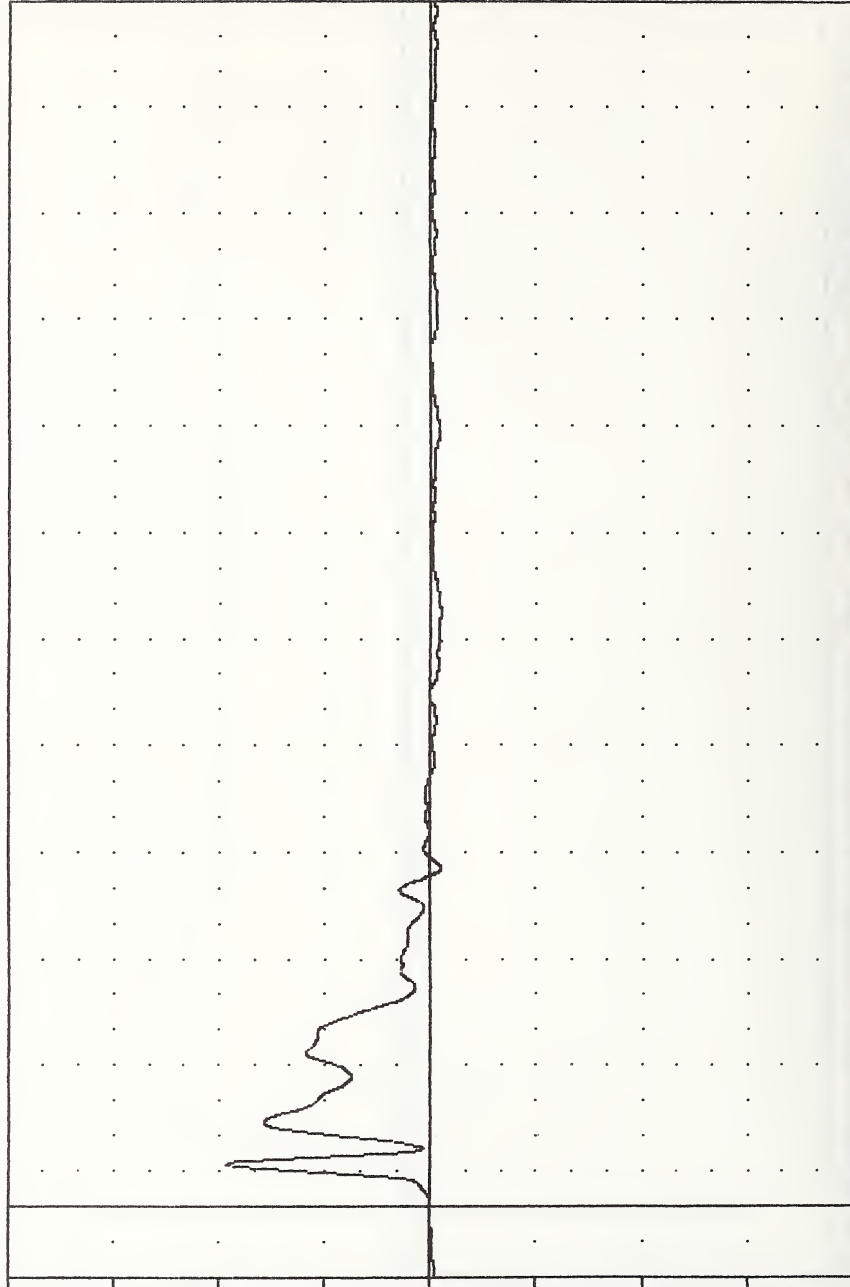
MIN, MAX VALUES = -1.47e

95.50.

28.92 e

11.75

ACCELERATION (G)

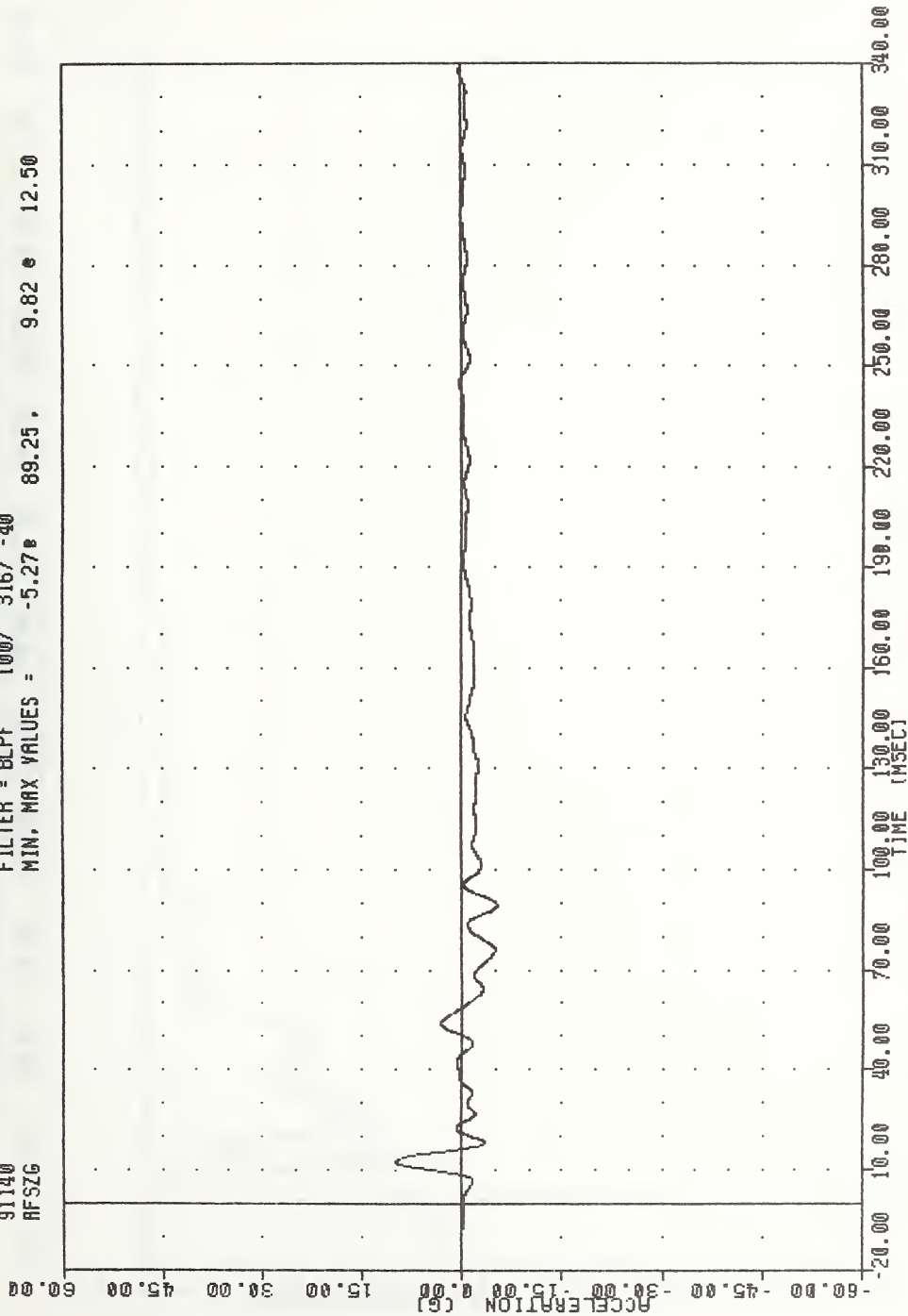


MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT FRONT SILL Y-AXIS ACCELERATION

VRTC . 910520  
LEFT SIDE IMPACT  
91140  
AFSG

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -5.27 89.25

9.82 e 12.50



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT FRONT SILL Z-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

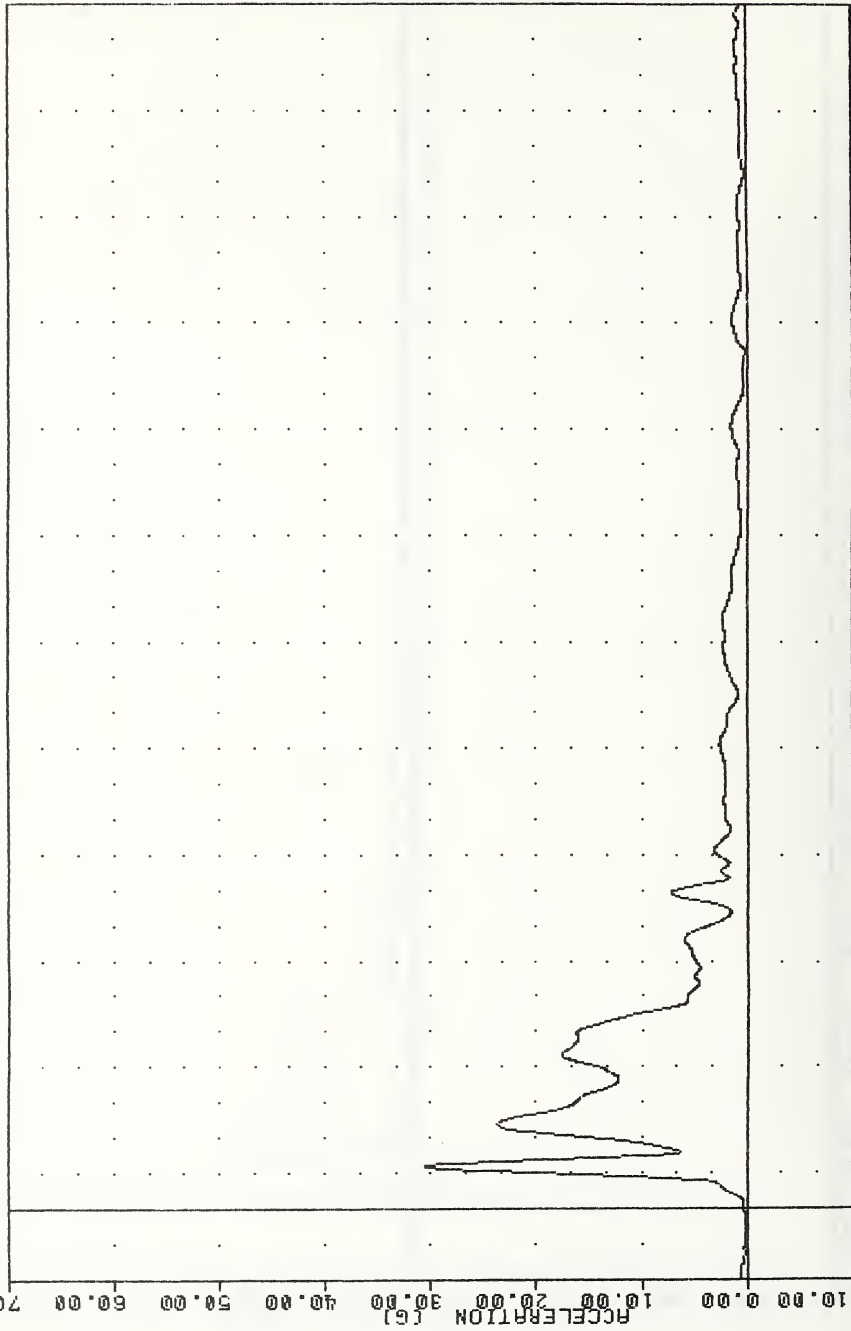
91140

RFSRG

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = 0.12 242.00, 30.54 11.75

70.00



-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT FRONT SILL RESULTANT ACCELERATION

VRTC  
91140  
AFSYV

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.00s

0.25, 18.86 e 119.00

40.00

30.00

20.00

10.00

0.00

VELOCITY (MPH)

-10.00

-20.00

-30.00

-40.00

0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

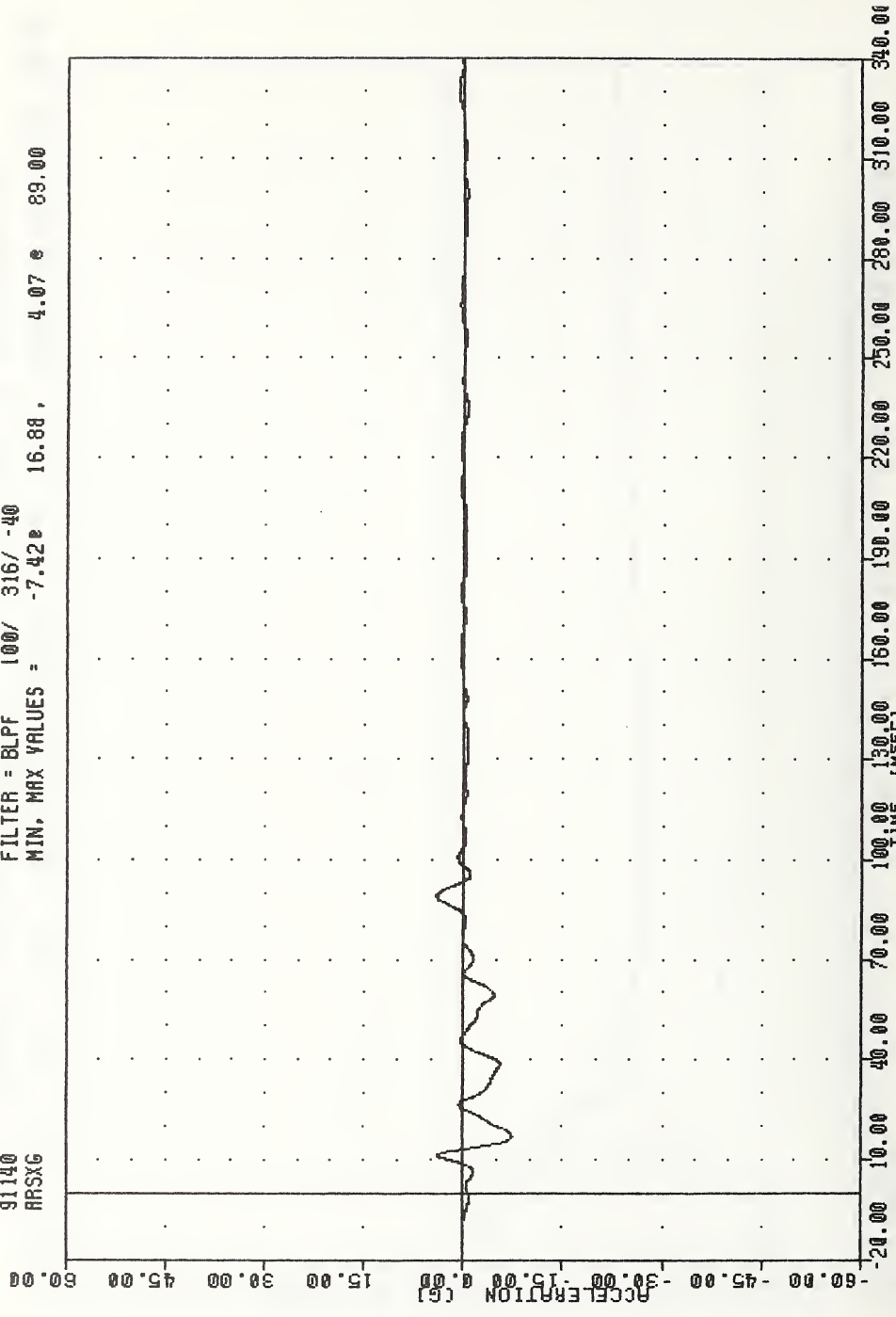
300.00

TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT FRONT SILL Y-AXIS VELOCITY

VRTC , 310520  
LEFT SIDE IMPACT  
91140  
ARXG

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -7.42 16.88 , 4.07 89.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT REAR SILL X-AXIS ACCELERATION

VRTC , 910520

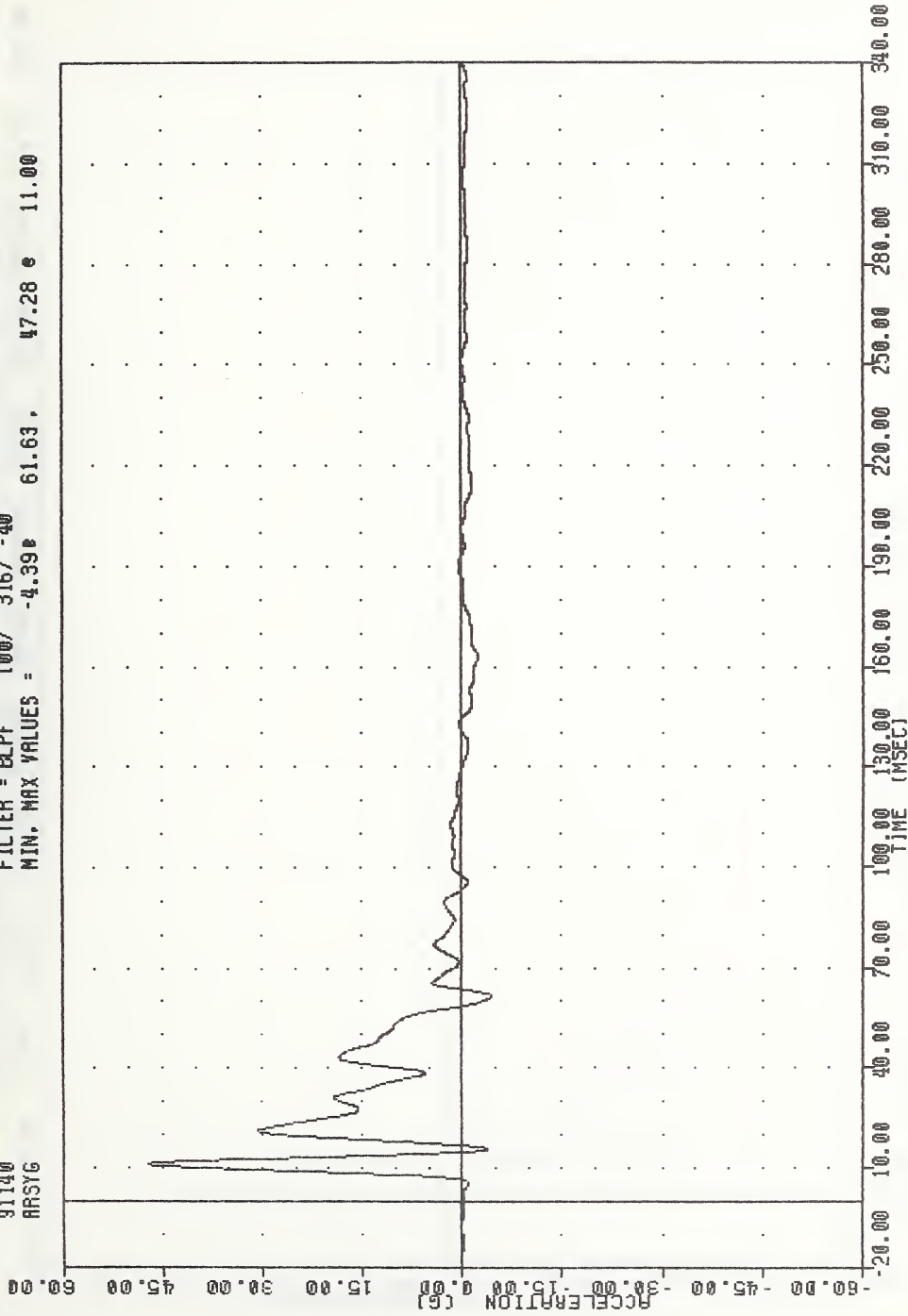
LEFT SIDE IMPACT

91140

ARSYG

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -4.39e 61.63, 47.28 e 11.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT REAR SILL Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

FILTER = BLPF 100/ 316/ -40

ARSZG

MIN, MAX VALUES =

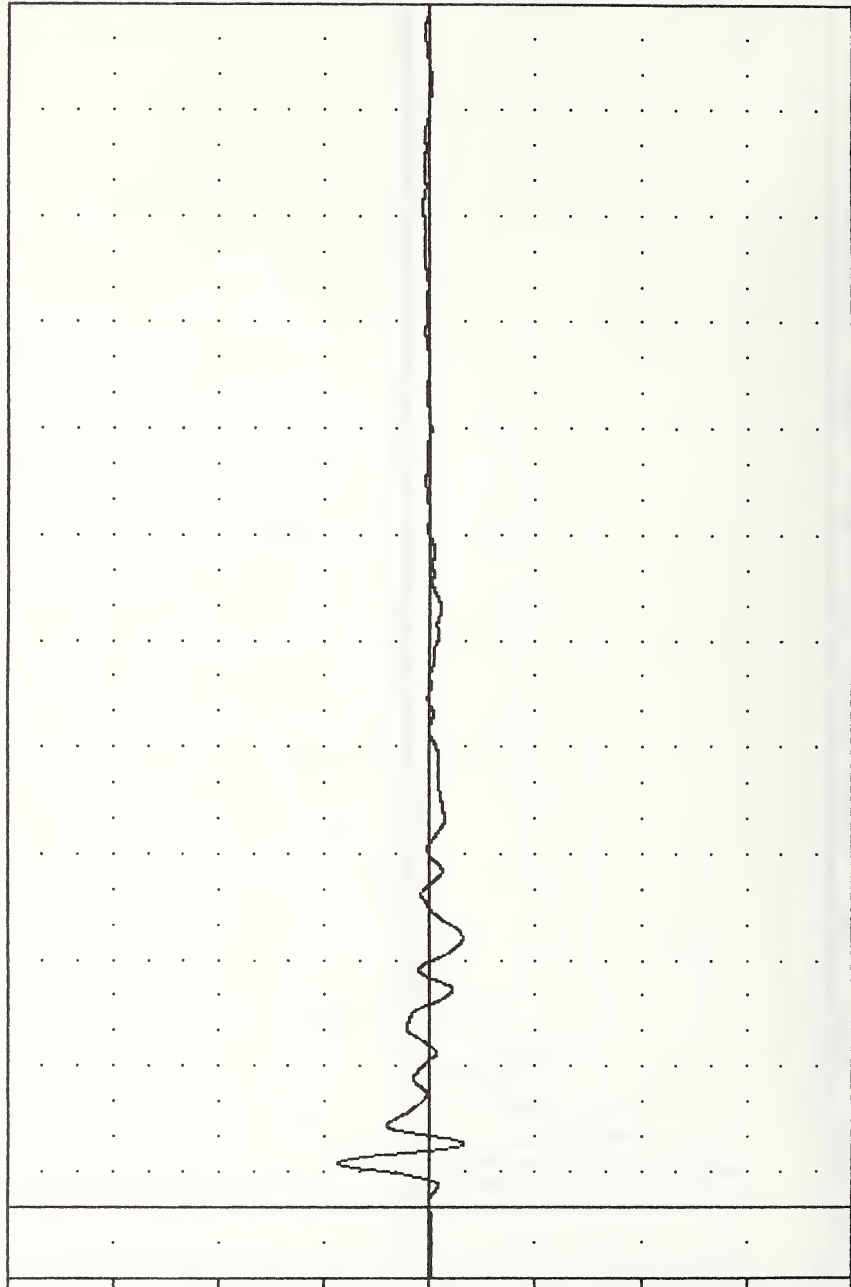
-4.82g

17.88,

12.99 g

12.38

ACCELERATION (G)



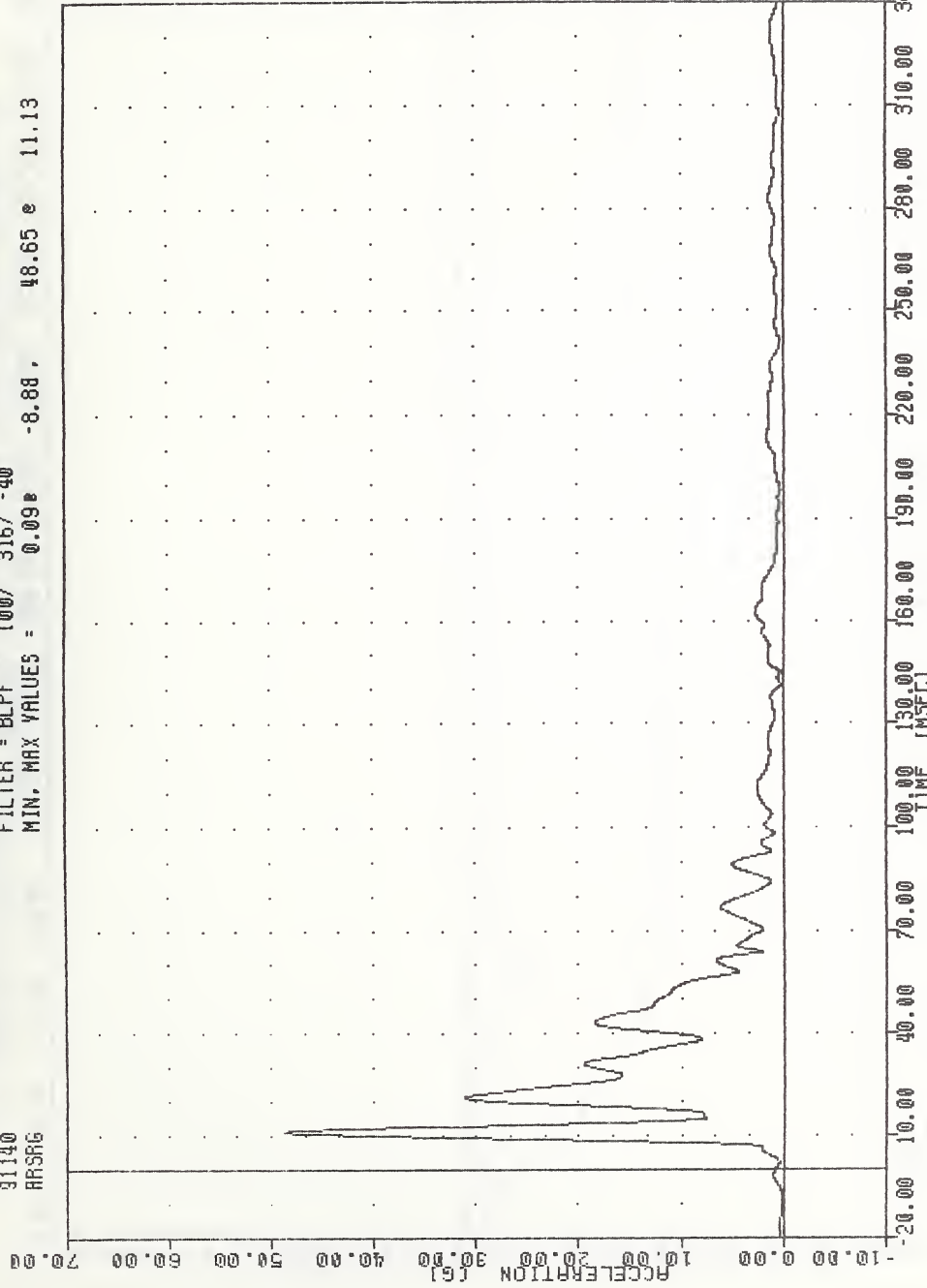
-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT REAR SILL Z-AXIS ACCELERATION

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
RRSRG

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = 0.09e

-8.88 , 48.65 e 11.13



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT REAR SILL RESULTANT ACCELERATION



VRTC - 910520

LEFT SIDE IMPACT

91140

HRSTV

FILTER = ALPF 1650/ 5214/ -40

MIN, MAX VALUES = -0.11e

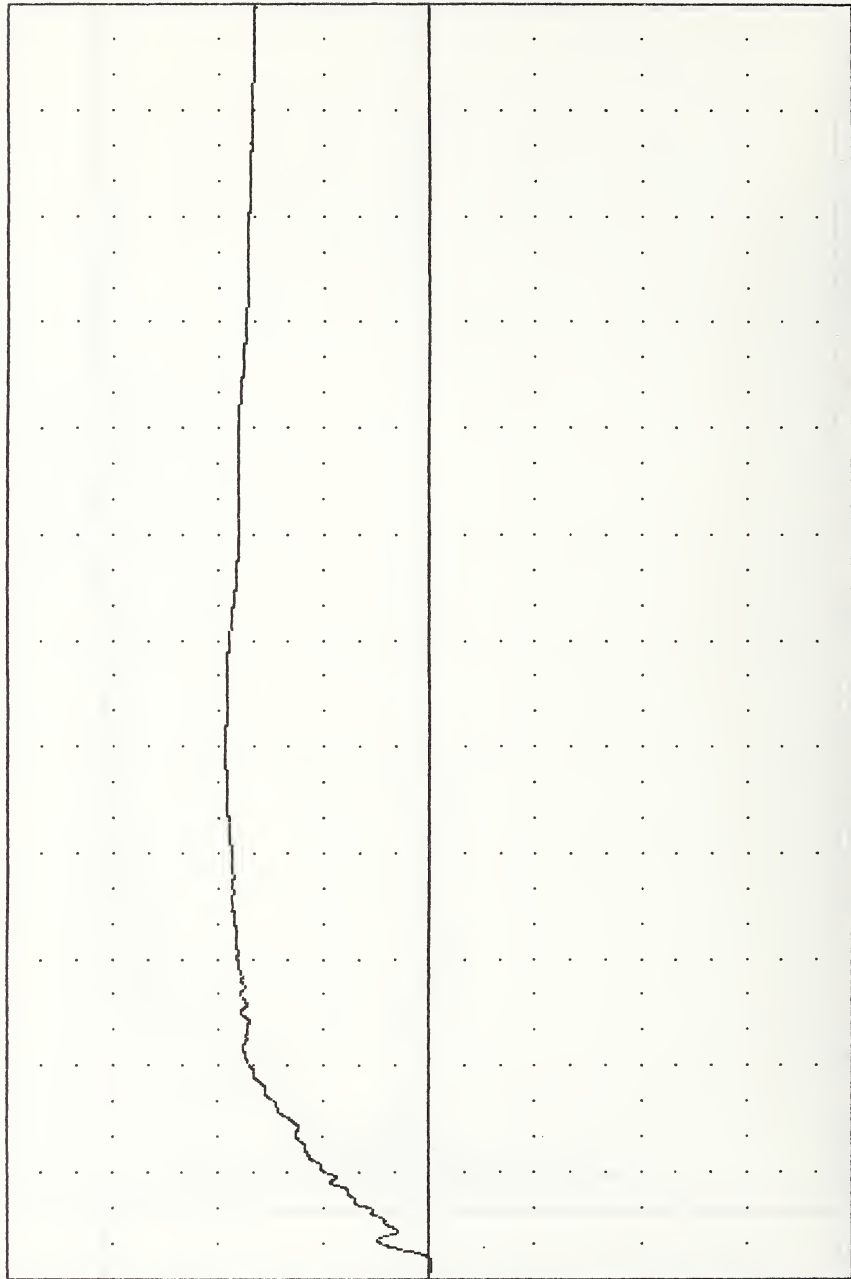
4.50,

19.31 e

126.13

40.00  
30.00  
20.00  
10.00  
0.00  
-10.00  
-20.00  
-30.00  
-40.00

VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

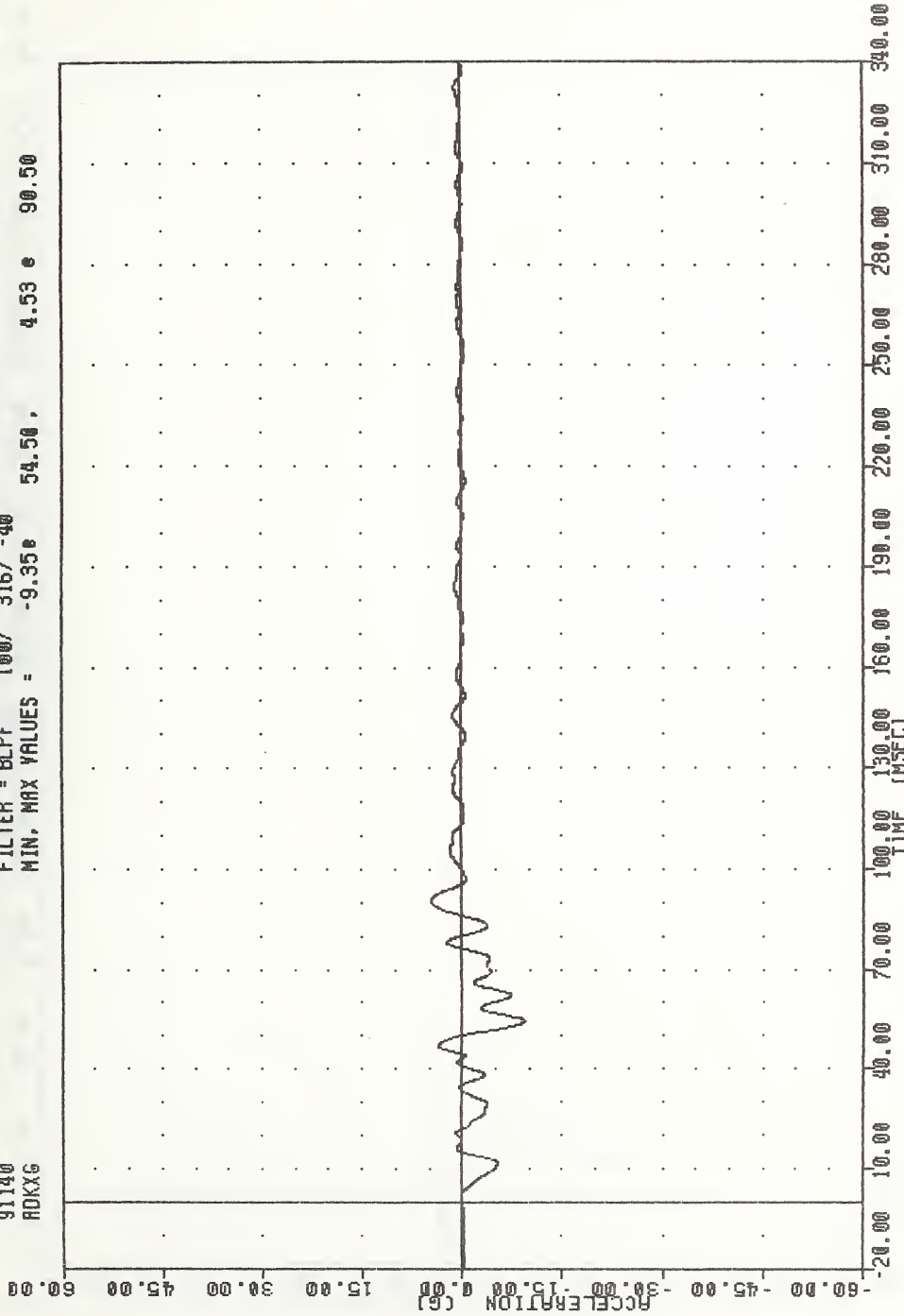
TIME  
(INSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE RIGHT REAR SILL Y-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
RDXG

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -9.35e 54.50,

4.53 e 90.50



VRTC , 910520

LEFT SIDE IMPACT

91140

ADKYG

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES =

-1.82e

149.13,

30.27 e

11.13

60.00

45.00

30.00

15.00

0.00

ACCELERATION (G)

-15.00

-30.00

-45.00

-60.00

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

TIME (INSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE REAR DECK Y-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

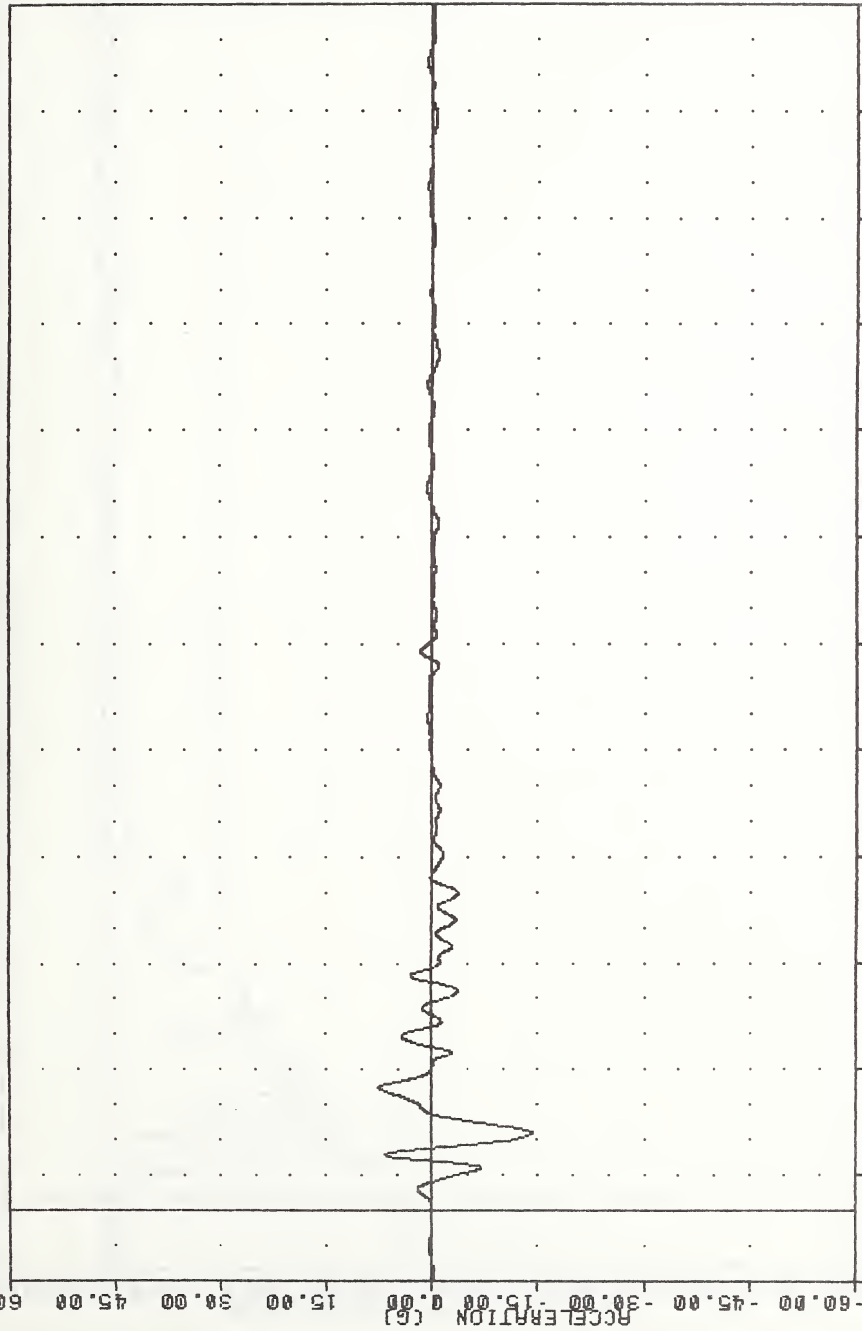
ADKZG

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = -14.09 21.88

7.58 34.88

60.00



-20.00 10.00 20.00 30.00 40.00 50.00 60.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE REAR DECK Z-AXIS ACCELERATION

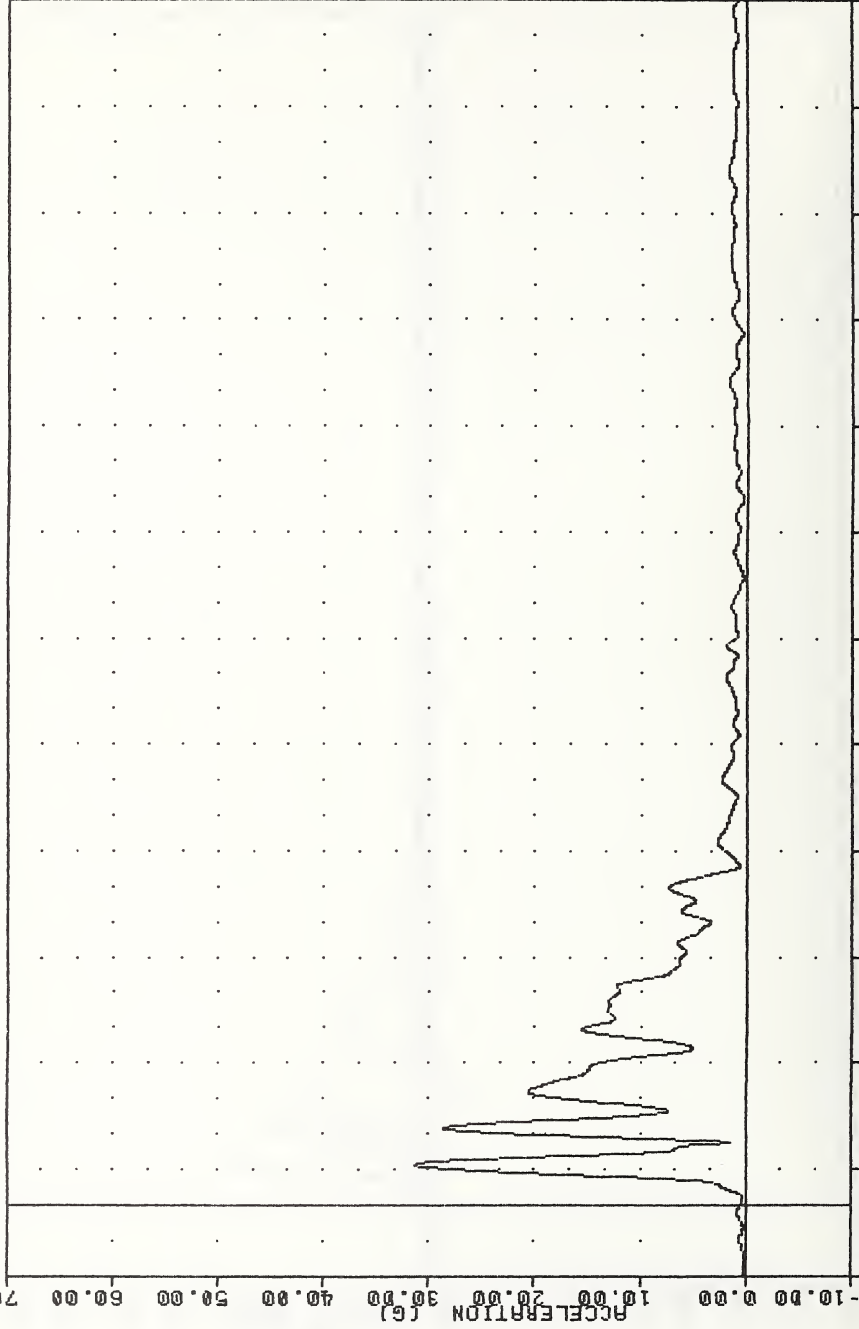
VRTC , 910520  
LEFT SIDE IMPACT

91140  
RDKRG

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = 0.14e

31.27 e 11.13  
-15.50 ,

70.00



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE REAR DECK RESULTANT ACCELERATION

VRTC # 910520

LEFT SIDE IMPACT

91140

ADKVV

FILTER = ALPF 1650/ 5214/ -40

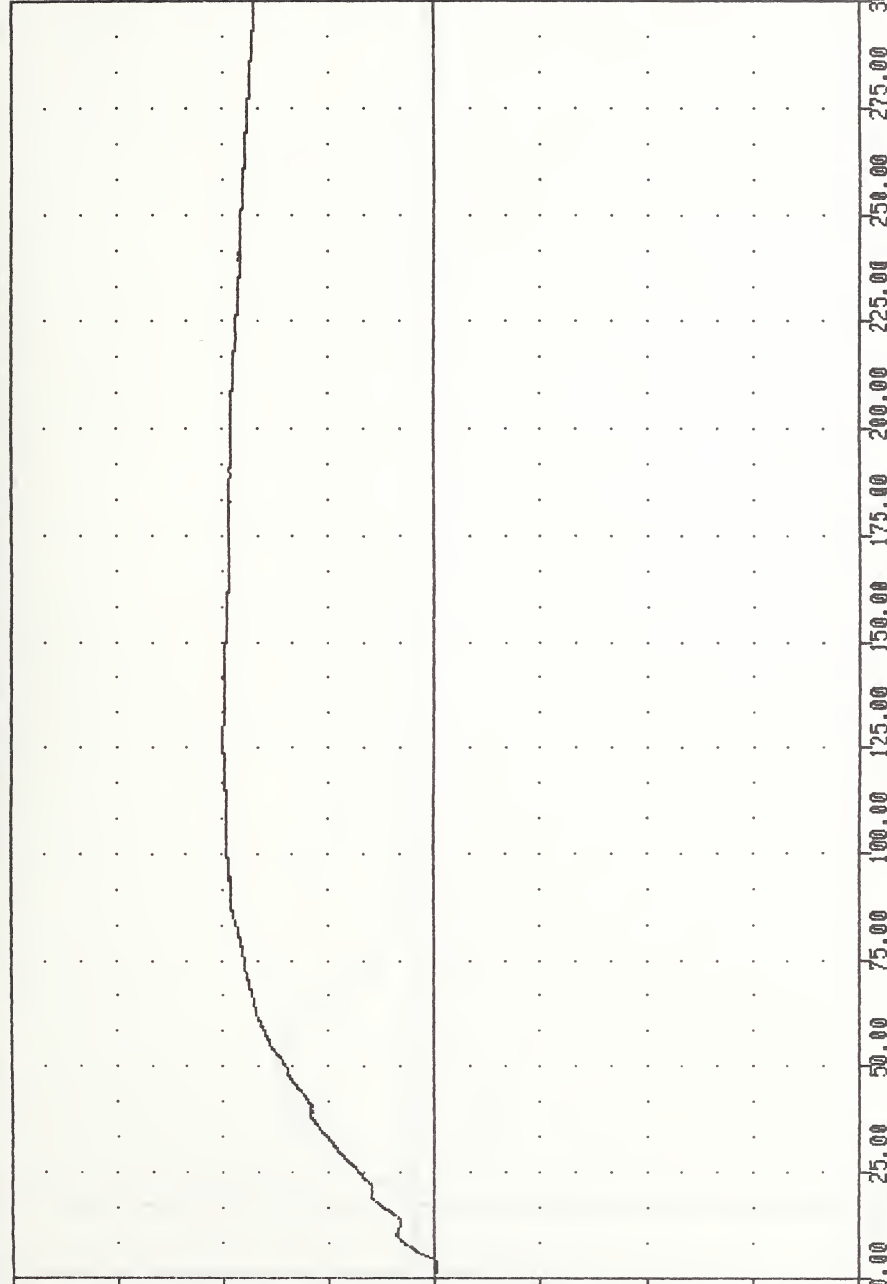
MIN. MAX VALUES = -0.15

2.75,

19.93 e

126.50

VELOCITY (MPH)



0.00 25.00 50.00 75.00 100.00 125.00 150.00 175.00 200.00 225.00 250.00 275.00 300.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
VEHICLE REAR DECK Y-AXIS VELOCITY

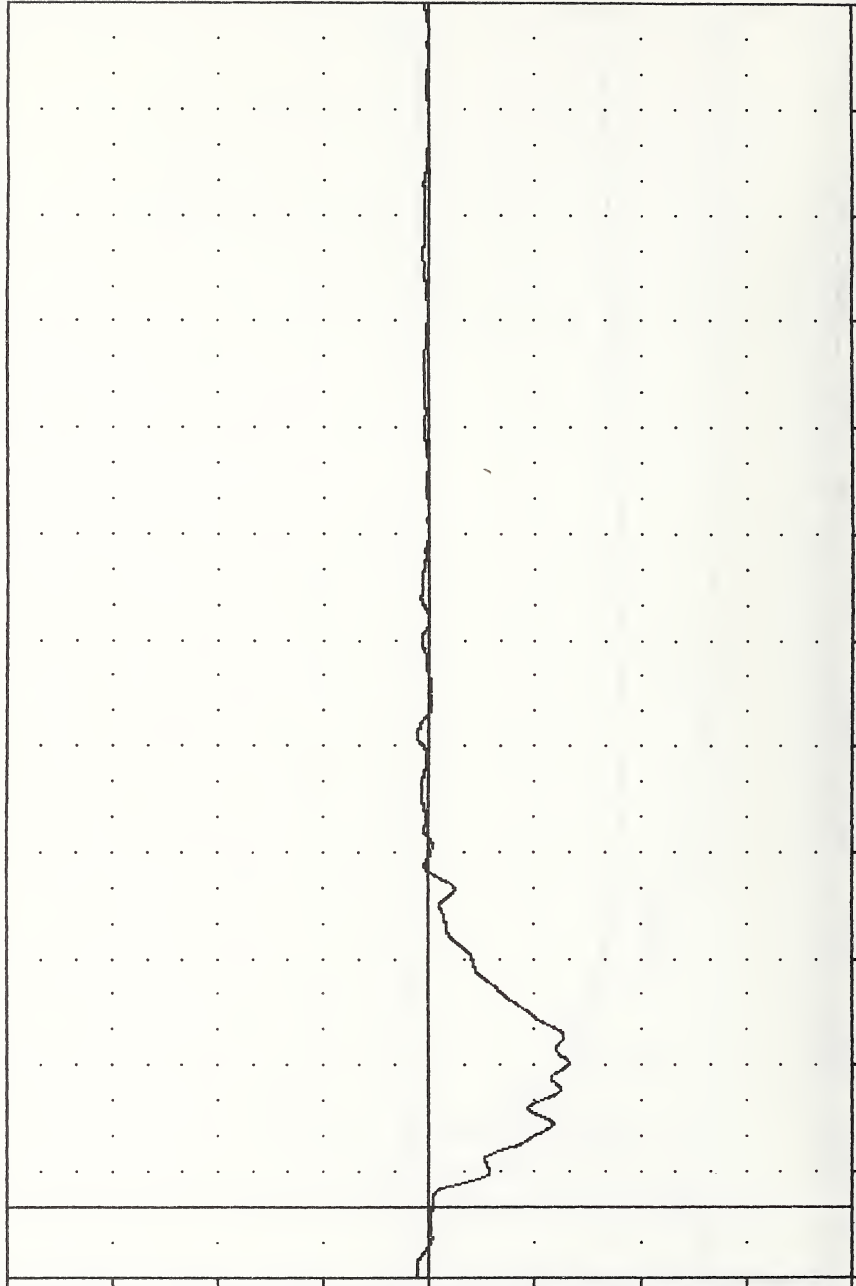
VRTC , 910520  
LEFT SIDE IMPACT

91140  
BCXG

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -19.85 40.50

1.69 132.50

ACCELERATION (G)



-20.00 10.00 40.00 70.00 100.00 130.00 160.00 190.00 220.00 250.00 280.00 310.00 340.00

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER CENTER OF GRAVITY X-AXIS ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

BCG/G

FILTER = BLPF 100/ 316/ -40

MIN, MAX VALUES = -7.83

19.75,

2.57

114.63

60.00

45.00

30.00

15.00

0.00

-15.00

-30.00

-45.00

-60.00

ACCELERATION (G)

-20.00

10.00

40.00

70.00

100.00

130.00

160.00

190.00

220.00

250.00

280.00

310.00

340.00

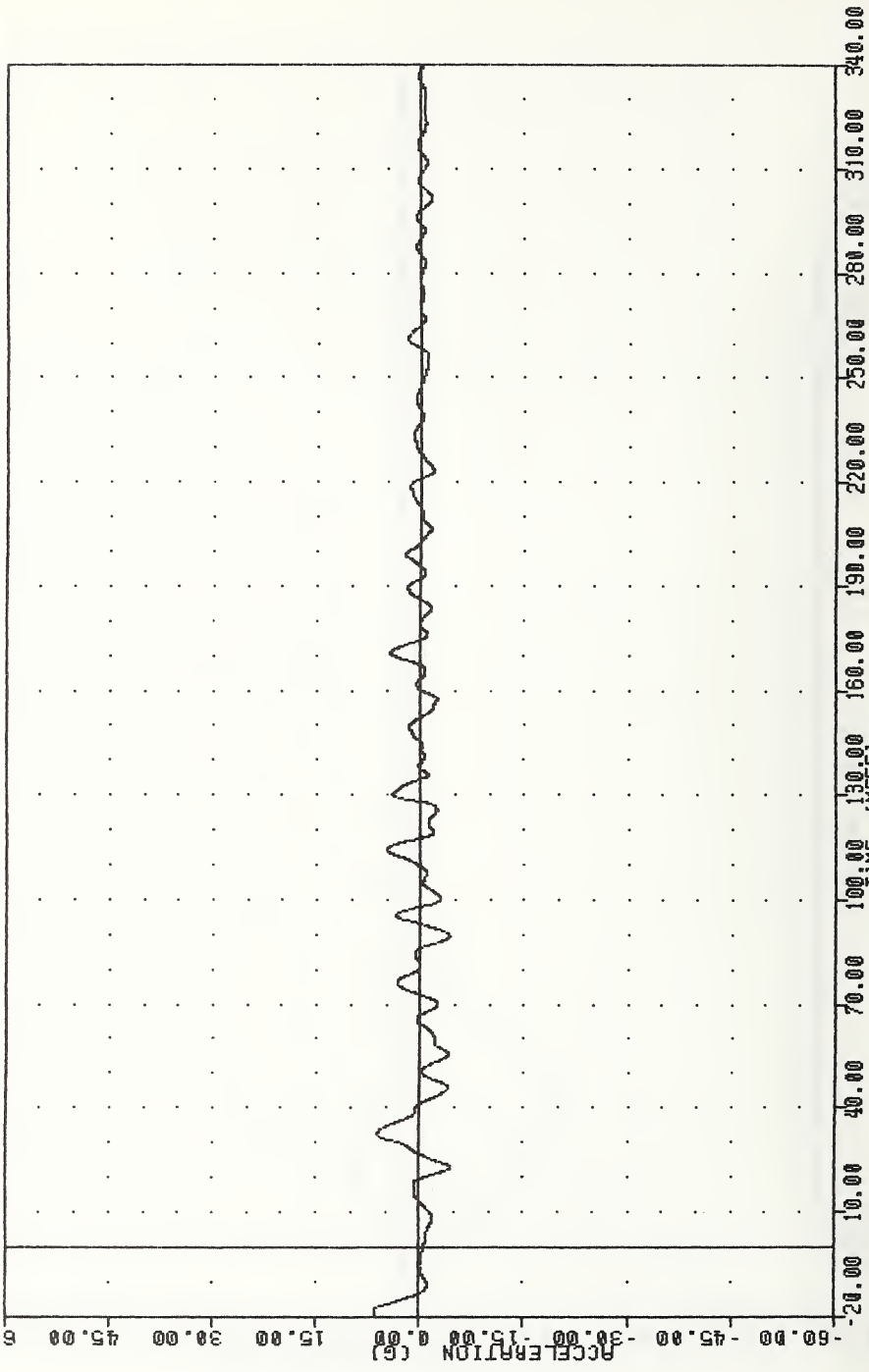
Time (msec)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER CENTER OF GRAVITY Y-AXIS ACCELERATION



VRTC , 910520  
LEFT SIDE IMPACT  
31140  
BC626

FILTER = BLPF 100/ 316/ -40  
MIN, MAX VALUES = -4.43 22.75 , 6.52 0 -20.00



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER CENTER OF GRAVITY Z-AXIS ACCELERATION

VRTC .910520

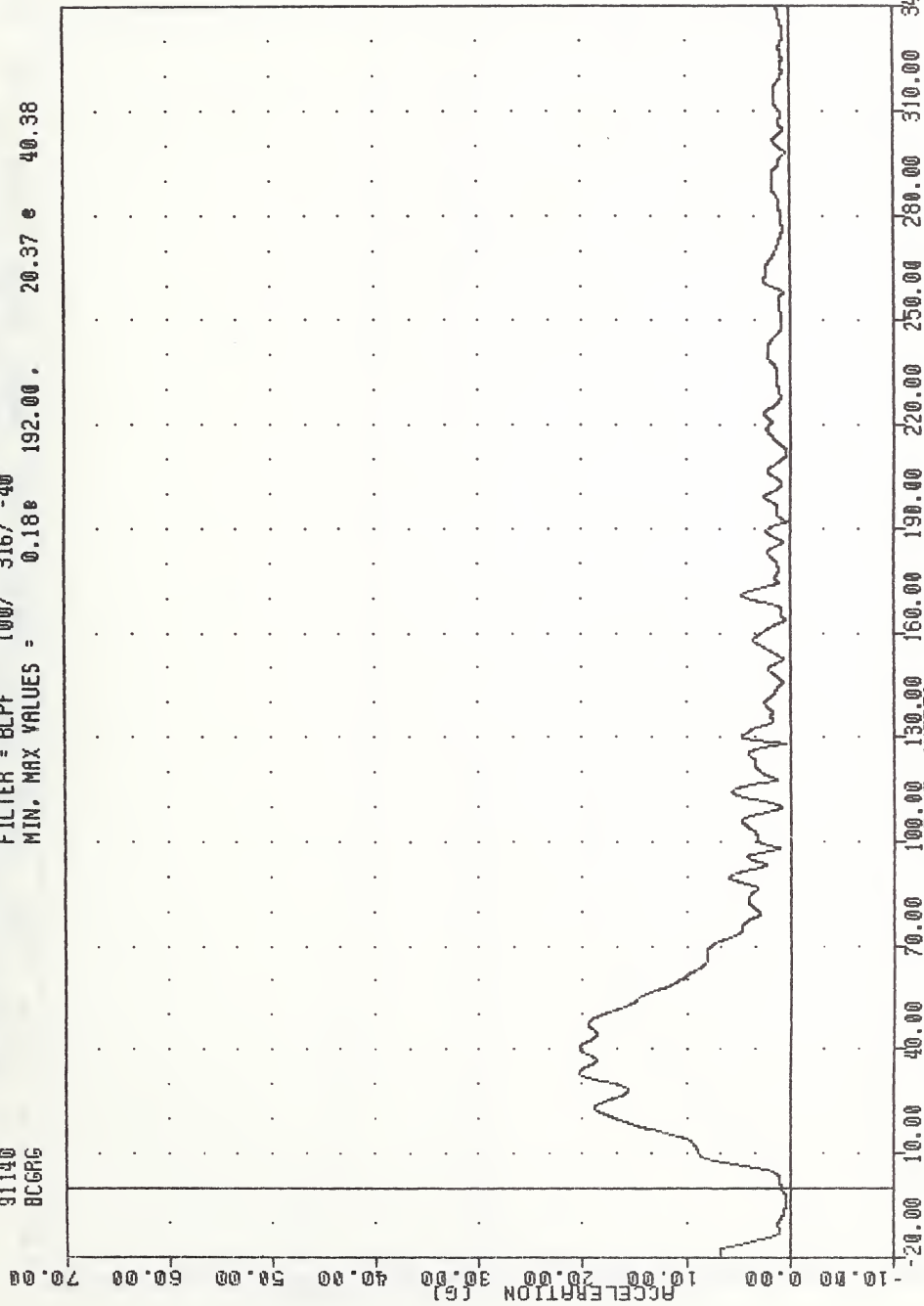
LEFT SIDE IMPACT

91140

BCGRG

FILTER = BLPF 100/ 316/ -40

MIN. MAX VALUES = 0.18e 192.00, 20.37 e 40.38



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER CENTER OF GRAVITY RESULTANT ACCELERATION

VRTC , 910520

LEFT SIDE IMPACT

91140

BCGXV

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 13.818

100.25 ,

34.80 e

0.38

40.00

30.00

20.00

10.00

0.00

-10.00

-20.00

-30.00

-40.00

VELOCITY (MPH)

0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

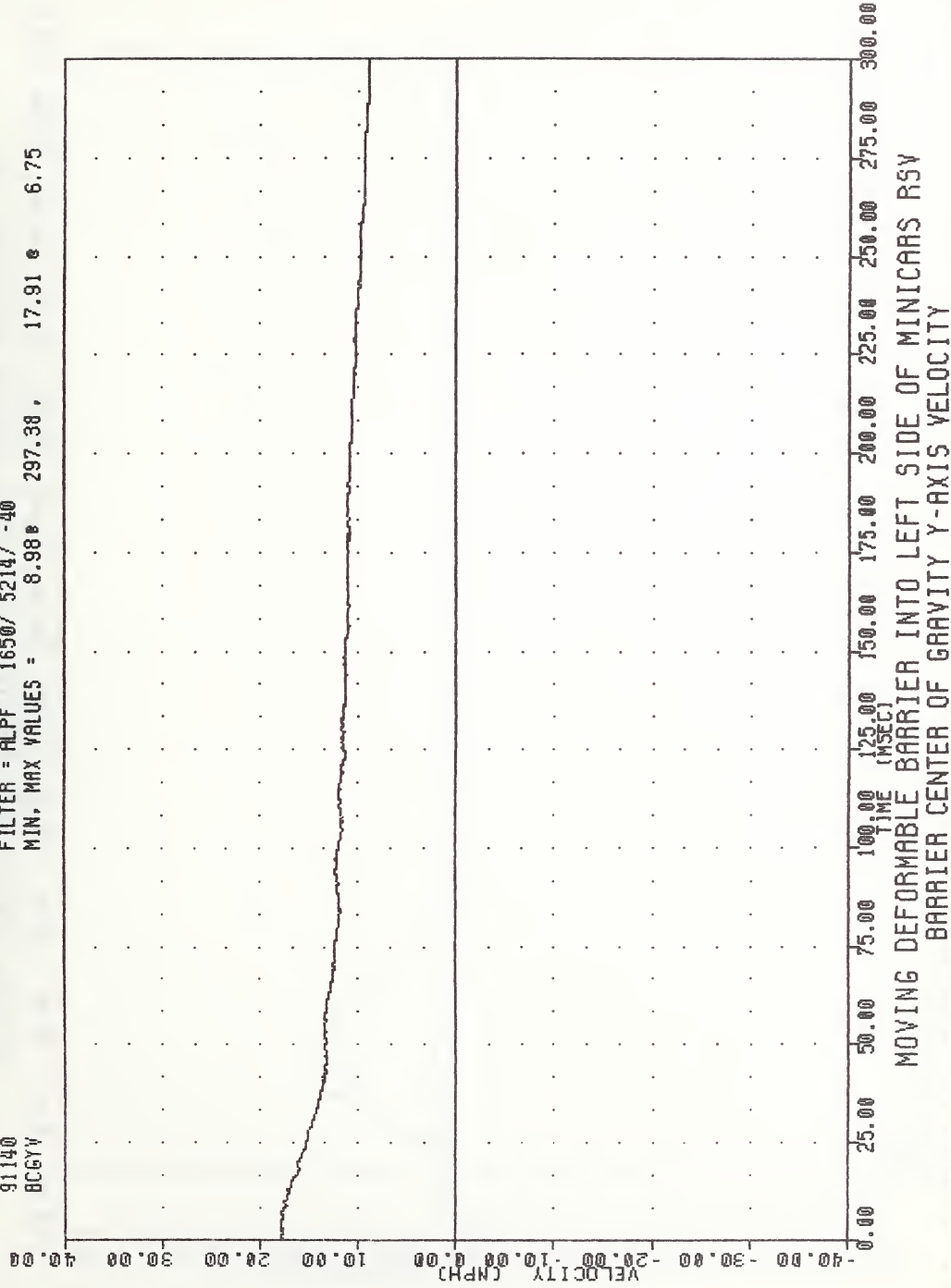
300.00

TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER CENTER OF GRAVITY X-AXIS VELOCITY

VRTC , 910520  
LEFT SIDE IMPACT  
91140  
BC6YV

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 8.98 297.38 , 17.91 6.75

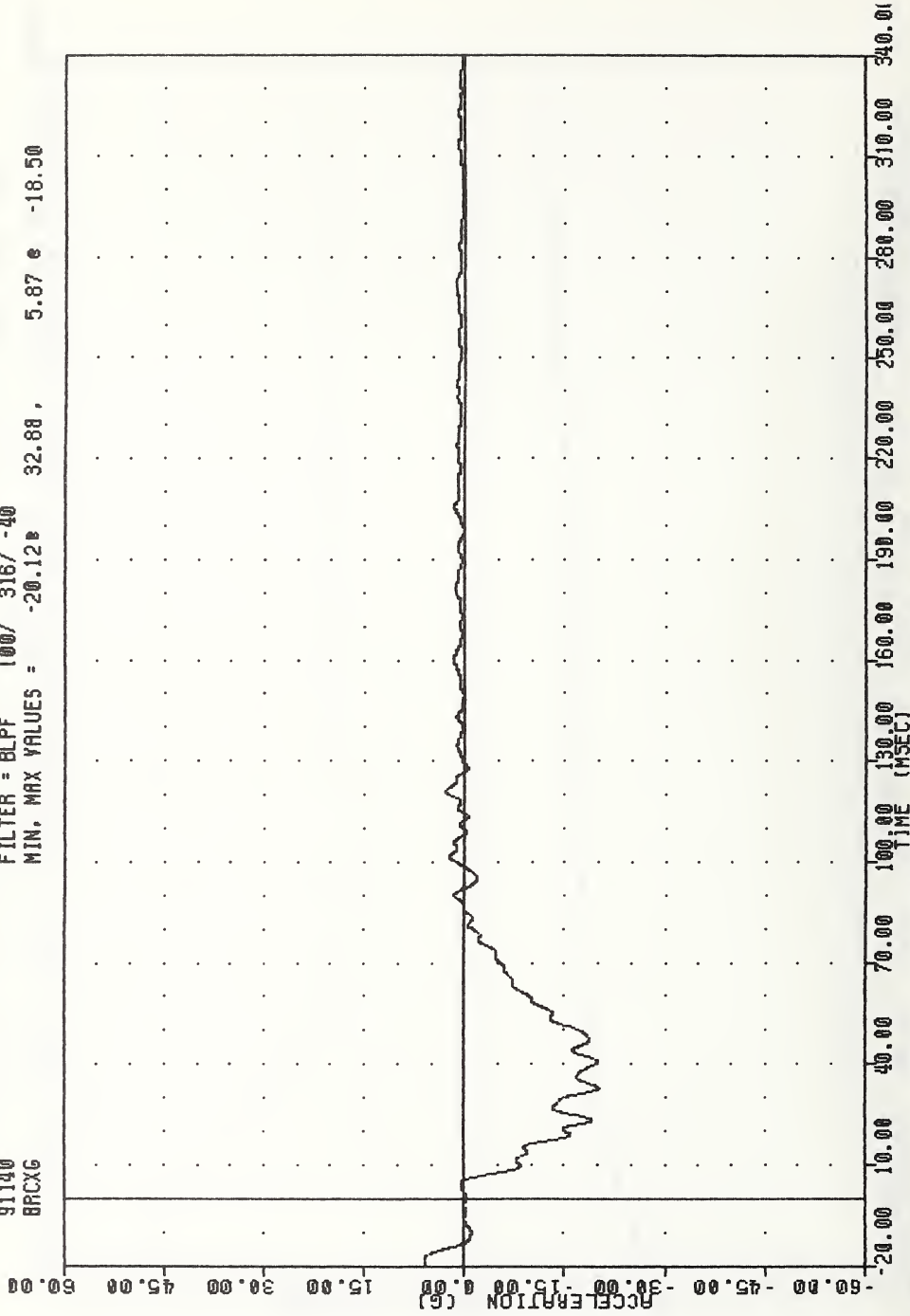


VRTC , 910520  
LEFT SIDE IMPACT

91140  
BRXG

FILTER = BLPF 100/ 316/ -40  
MIN. MAX VALUES = -20.12 32.88

5.87 6 -18.50



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER REAR CROSSMEMBER X-AXIS ACCELERATION

VRTC , 910520

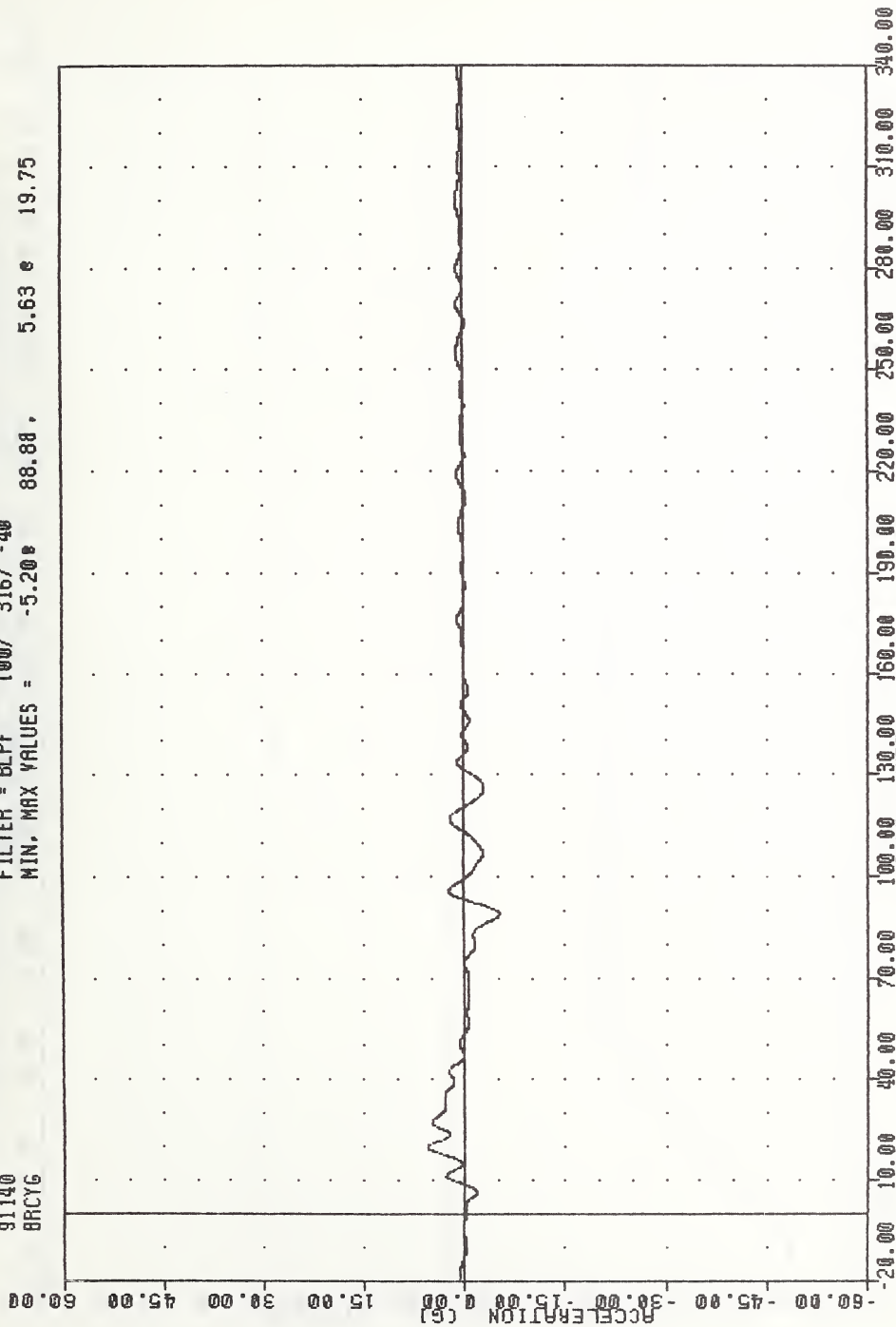
LEFT SIDE IMPACT

91140

BRVYG

FILTER = BLPF 100/ 316/ -40

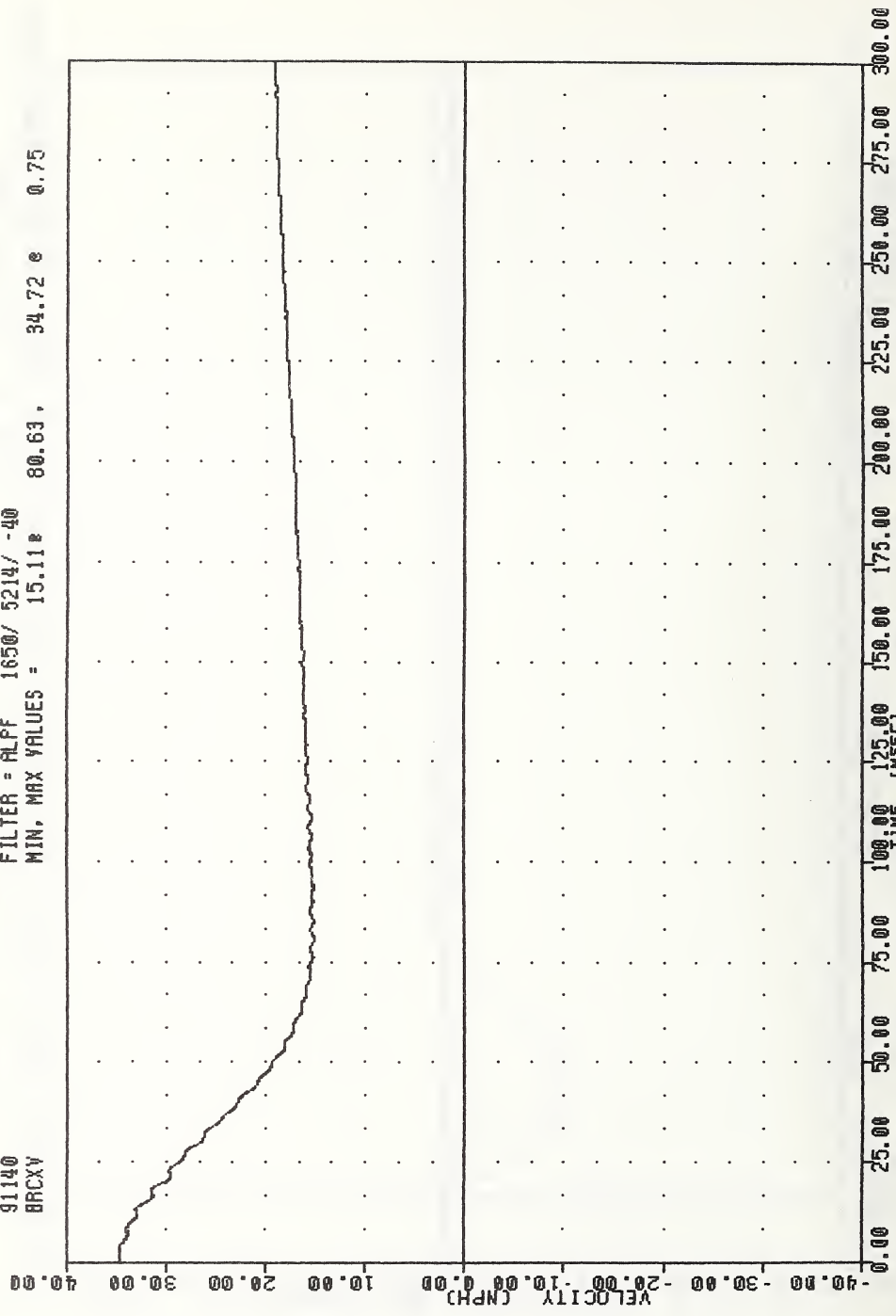
MIN, MAX VALUES = -5.20 88.88, 5.63 19.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER REAR CROSSMEMBER Y-AXIS ACCELERATION

VRIC , 910520  
 LEFT SIDE IMPACT  
 91140  
 BRCXV

FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = 15.11 80.63 , 34.72 0 0.75



MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
 BARRIER REAR CROSSMEMBER X-AXIS VELOCITY

VRTC , 910520

LEFT SIDE IMPACT

91140

BRCV

FILTER = ALPF 1650/ 5214/ -40

MIN. MAX VALUES = 17.35

4.25 ,

19.83 e

48.13

40.00

30.00

20.00

10.00

0.00

VELOCITY (MPH)

-10.00

-20.00

-30.00

-40.00

0.00

25.00

50.00

75.00

100.00

125.00

150.00

175.00

200.00

225.00

250.00

275.00

300.00

TIME (MSEC)

MOVING DEFORMABLE BARRIER INTO LEFT SIDE OF MINICARS RSV  
BARRIER REAR CROSSMEMBER Y-AXIS VELOCITY





APPENDIX C

DUMMY CERTIFICATION



DRIVER DUMMY

DUMMY NO.: 02

BIOSID EXTERIOR DIMENSIONSDummy Serial No.: 02Dummy Manufacturer: HumaneticsTest/Calibration No.: CAL08Calibration Date: 05/16/91

Dimensional Symbol	Description	Specified Dimension	Dummy Dimension
A	Total Sitting Height	34.6 - 35.0	<u>35.2*</u>
B	Shoulder Pivot Height	19.9 - 20.5	<u>20.4</u>
C	"H" Point Height	3.5 - 4.0	<u>3.8</u>
D	"H" Point from Seat Back	5.2 - 5.5	<u>5.3</u>
E	Shoulder Pivot from Backline	5.2 - 5.8	<u>5.2</u>
F	Thigh Clearance	5.5 - 6.1	<u>5.8</u>
G	Skull Cap to Backline	3.2 - 3.4 (Ref.)	<u>3.3</u>
H	Shoulder Height	22.0 - 22.4	<u>22.0</u>
J	Knee Pivot Height	19.1 - 19.7	<u>19.4</u>
K	Buttock Knee Length	22.8 - 23.8	<u>21.0**</u>
L	Foot Length	9.9 - 10.5	<u>10.1</u>
M	Foot Breadth	3.6 - 4.2	<u>3.9</u>
N	Location for Chest Measurements	16.0 (Ref.)	<u>16.0</u>
O	Chest Depth	10.6 - 11.0	<u>10.5*</u>
P	Chest Circumference with Pad	39.8 - 41.0	<u>41.5*</u>
R	Hip Width at "H" Point	14.5 - 15.5	<u>14.6</u>
S	Shoulder Width	16.2 - 16.8	<u>16.4</u>

\*Dummy did not meet all specifications.

\*\*The specified dimensions have been incorrectly published in the Biosid User's Manual, March 1991.

## TRANSPORTATION RESEARCH CENTER OF OHIO

## SHOULDER IMPACT - LINEAR IMPACTOR TEST

BIOSID DUMMY

14-May-91

## LEFT SIDE CONFIGURATION

VRTC

B02C8SH1

BIOSID SN02 SHOULDER IMP CAL08

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	53.00 %
IMPACT VELOCITY	14.47-15.06 FT/SEC	14.81 FT/SEC
IMPACTOR FORCE	809 - 1012 LB	-947. LB
PEAK DEFLECTION	0.83 - 1.15 IN	-1.05 IN

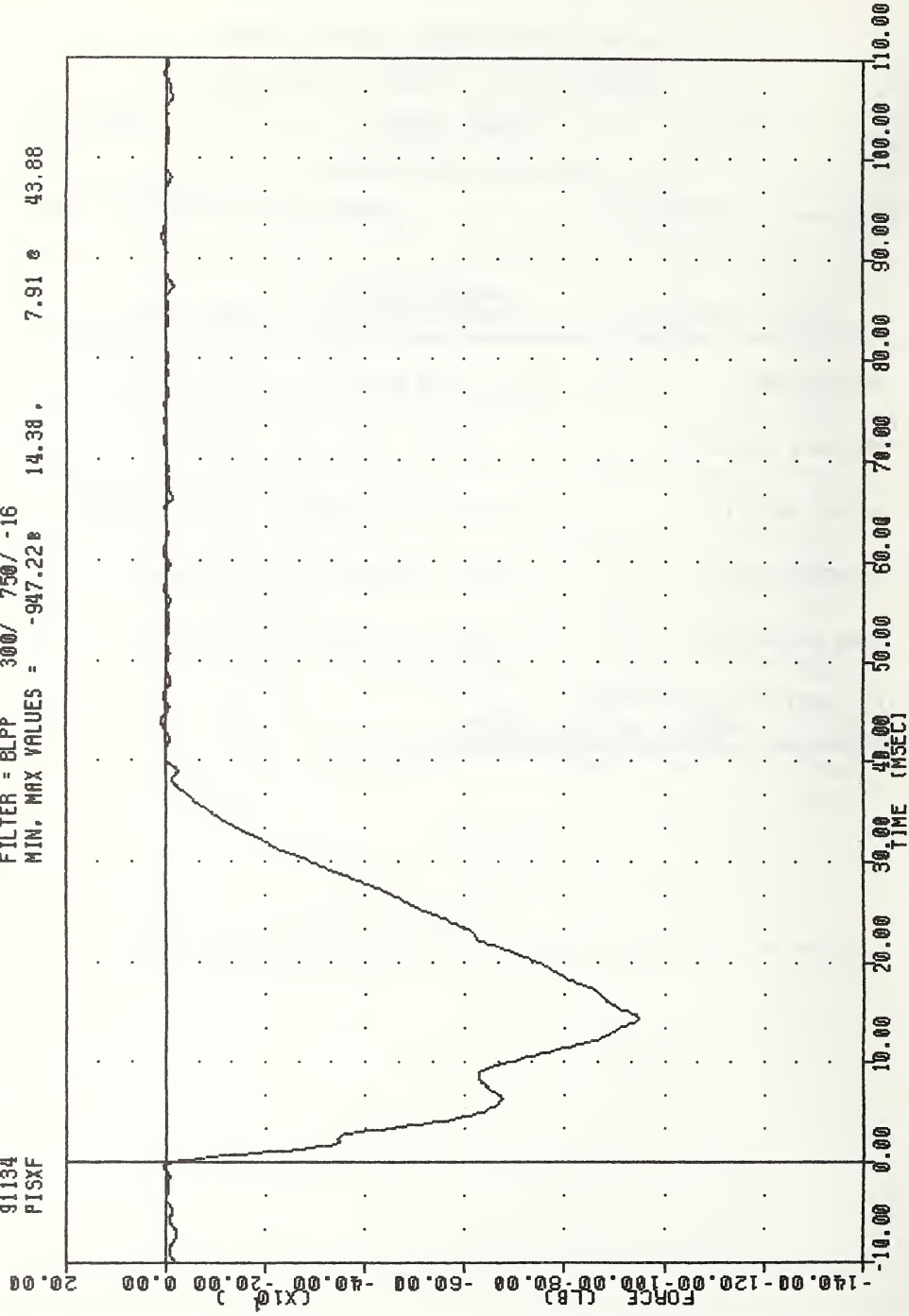
TEST MEETS SPECIFICATIONS

TECHNICIAN

*Chas. Middleton*

VRTC , B02C8SH1  
BIOSID SN02 SHOULDER IMP CAL00  
91134  
PISXF

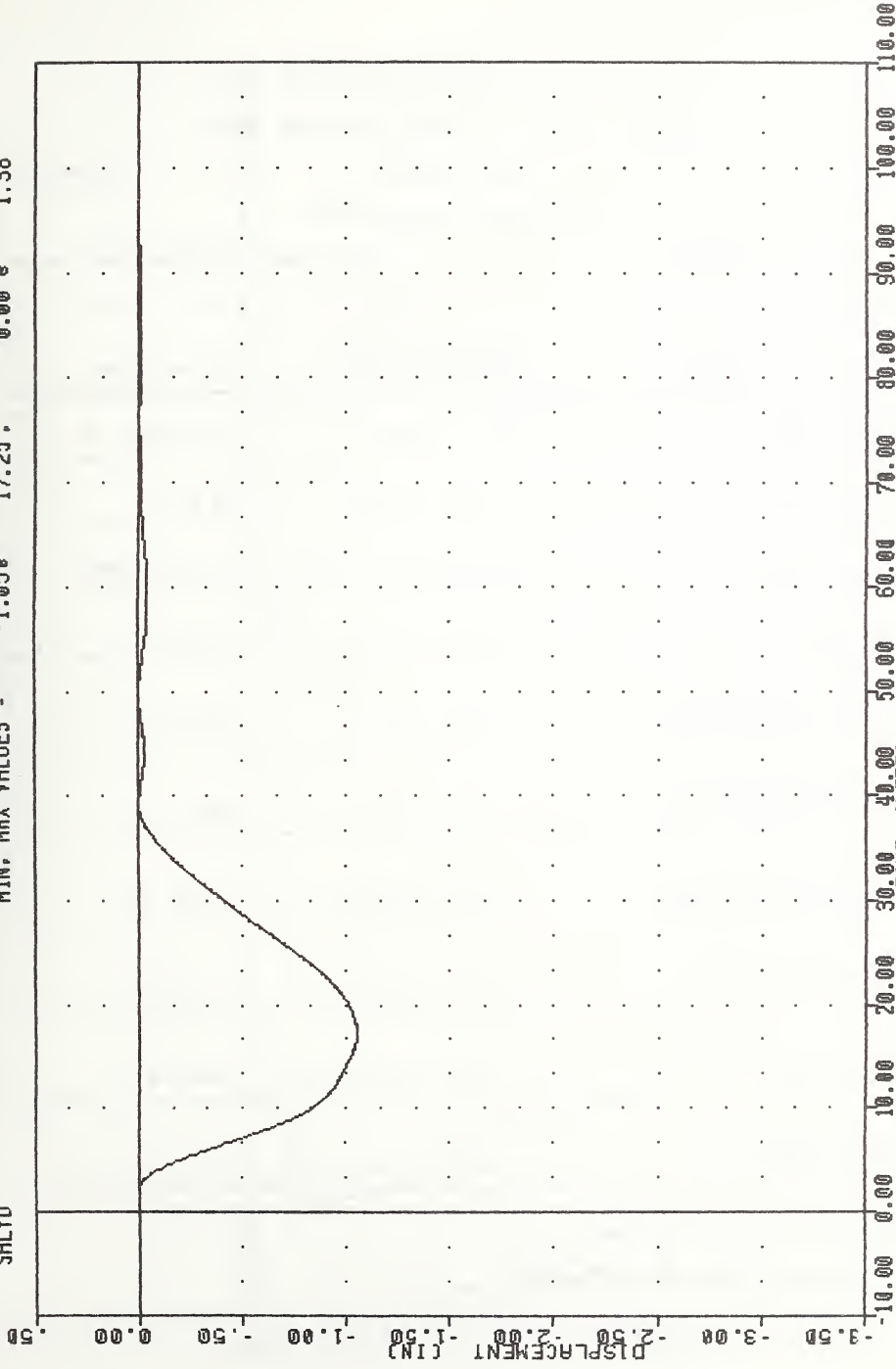
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -947.22 14.38 , 7.91 43.88



BIOSID DUMMY CALIBRATION -- LEFT SHOULDER IMPACT TEST  
IMPACTOR FORCE

VRTC , B02C8SH1  
 BIOSID SN02 SHOULDER IMP CAL08  
 91134  
 SHLYD

FILTER = BLPP 300/ 750/ -16  
 MIN. MAX VALUES = -1.05 17.25 0.00 1.38



BIOSID DUMMY CALIBRATION -- LEFT SHOULDER IMPACT TEST  
 LEFT SHOULDER DEFLECTION Y AXIS



## TRANSPORTATION RESEARCH CENTER OF OHIO

## ABDOMEN IMPACT - LINEAR IMPACTOR TEST

BIOSID DUMMY

14-May-91

## LEFT SIDE CONFIGURATION

VRTC

B02C8AB1

BIOSID SN02 ABDOMEN IMP CAL08

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	53.00 %
IMPACT VELOCITY	14.47-15.06 FT/SEC	14.81 FT/SEC
IMPACTOR FORCE	652 - 787 LB	-716. LB
PEAK ACCELERATION UPPER ABDOMINAL RIB	54 - 87 G	-79.6 G
PEAK ACCELERATION LOWER ABDOMINAL RIB	54 - 87 G	-80.6 G
PEAK DISPLACEMENT UPPER ABDOMINAL RIB	1.50 - 2.00 IN	-1.89 IN
PEAK DISPLACEMENT LOWER ABDOMINAL RIB	1.50 - 2.00 IN	-1.78 IN
PEAK ACCELERATION UPPER SPINE	5.5 - 8.2 G	-6.9 G
PEAK ACCELERATION LOWER SPINE	8.0 - 10.7 G	-9.0 G

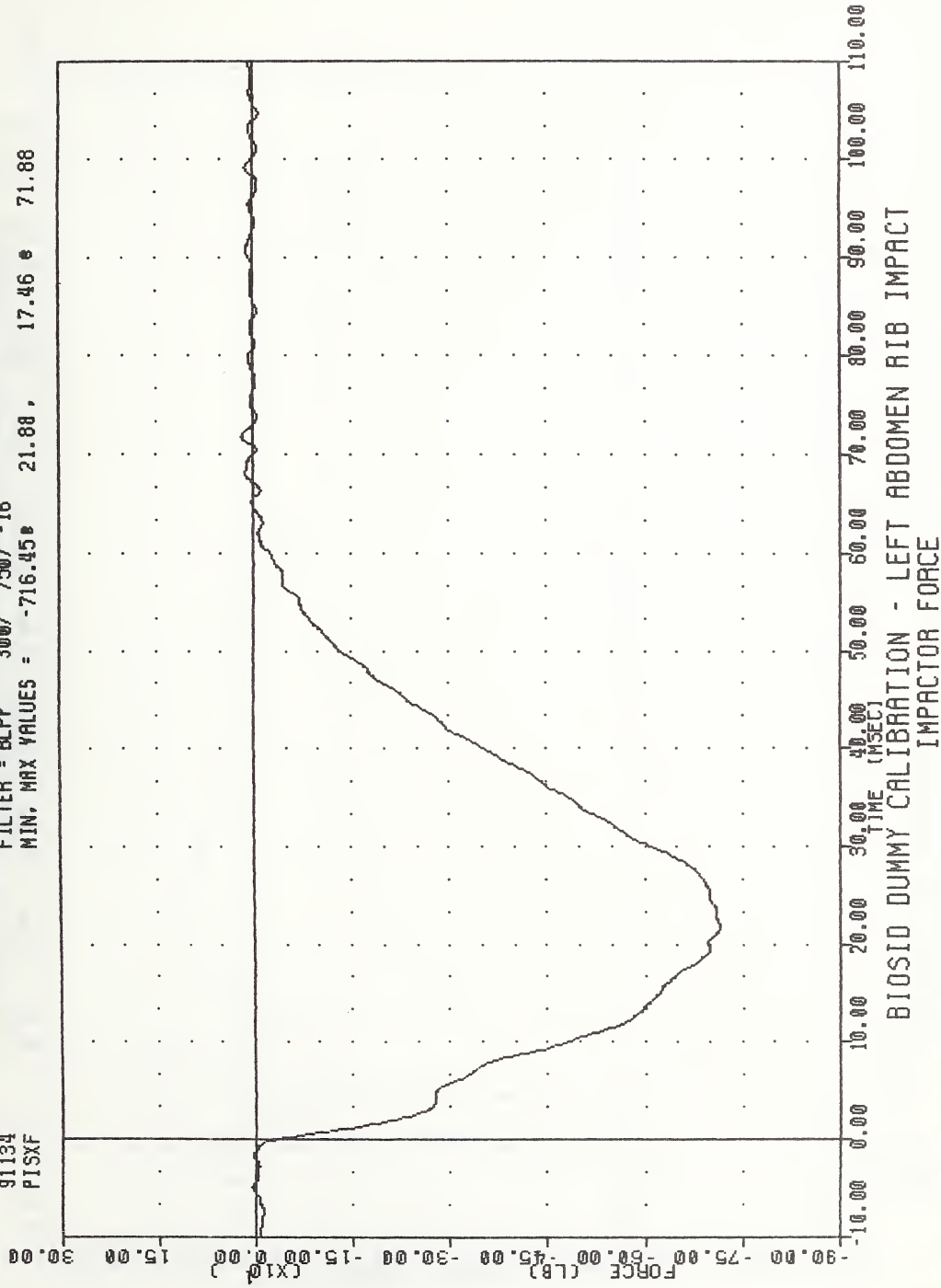
TEST MEETS SPECIFICATIONS

TECHNICIAN

Chas Middel

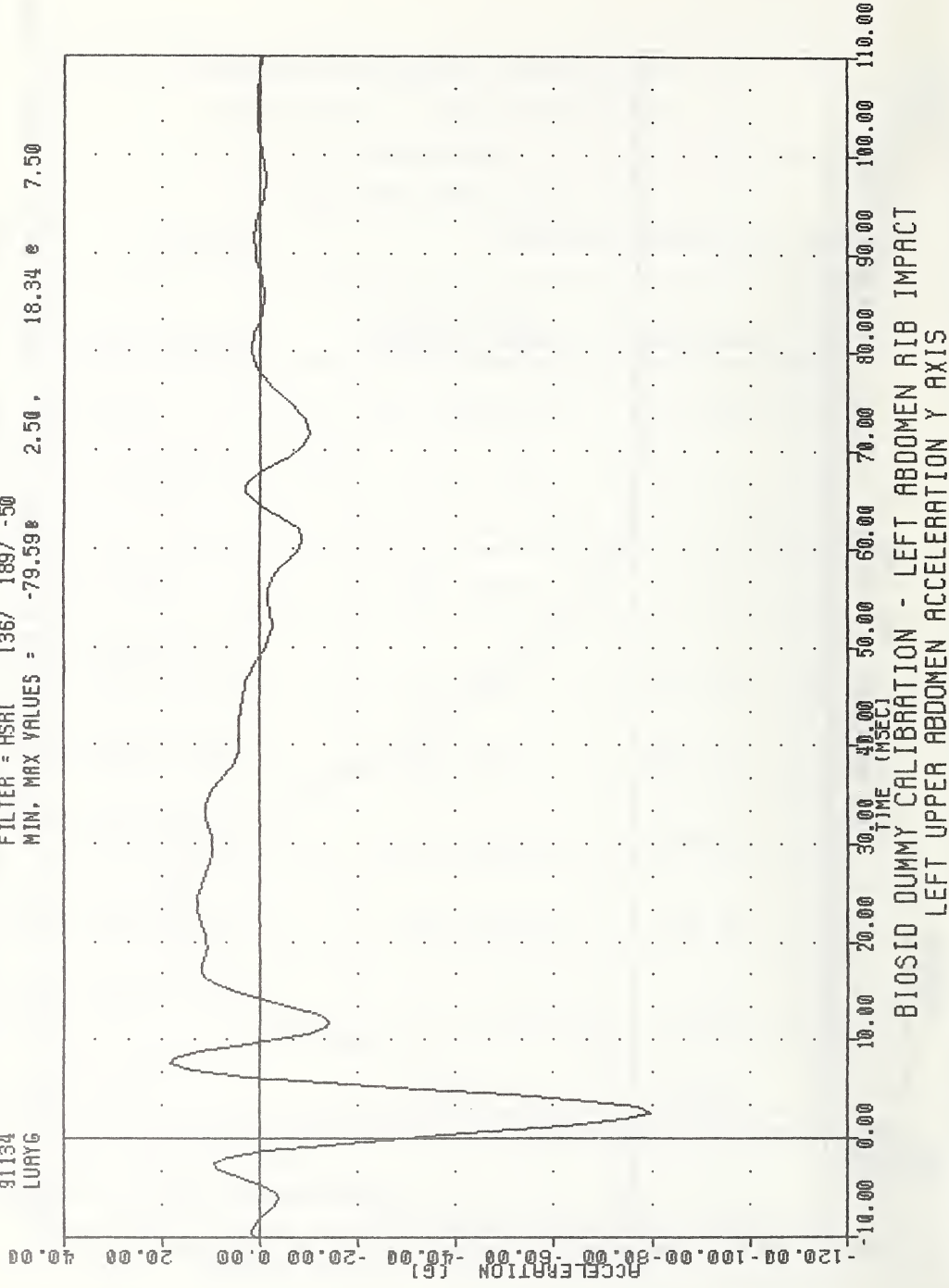
VRTC , 802C8881  
BIOSID SN02 ABDOMEN IMP CAL00  
91134  
PISXF

FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -716.45 21.88 , 17.46 71.88



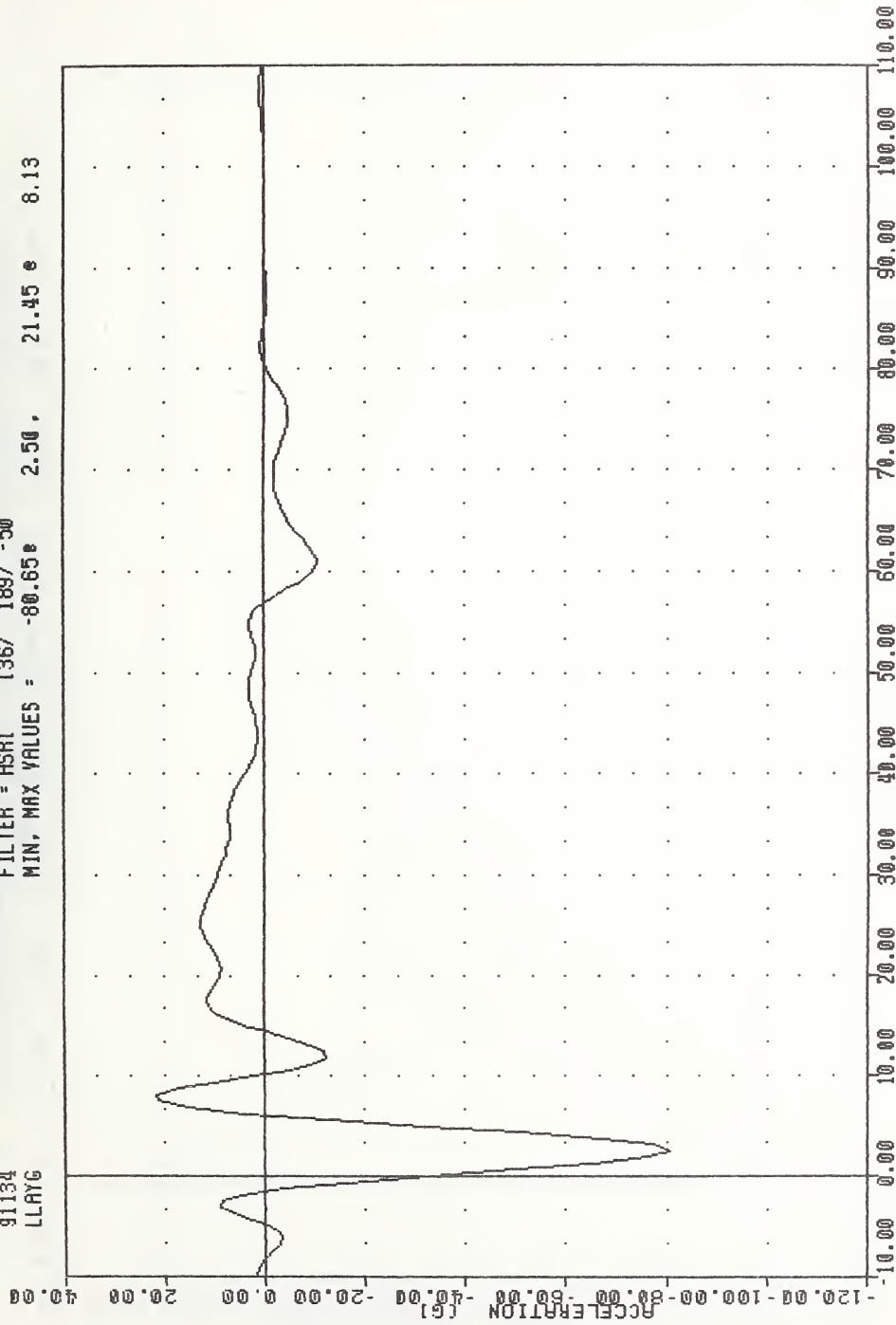
VRTC , B02C8A81  
BIOSID SN02 ABDOMEN IMP CAL08  
91134  
LWAYG

FILTER = HSAI 136/ 189/ -50  
MIN. MAX VALUES = -79.59e 2.50 , 18.34 e 7.50



VRTC  
BIOSID SN02 ABDOMEN IMP CAL08  
91134  
LLAY6

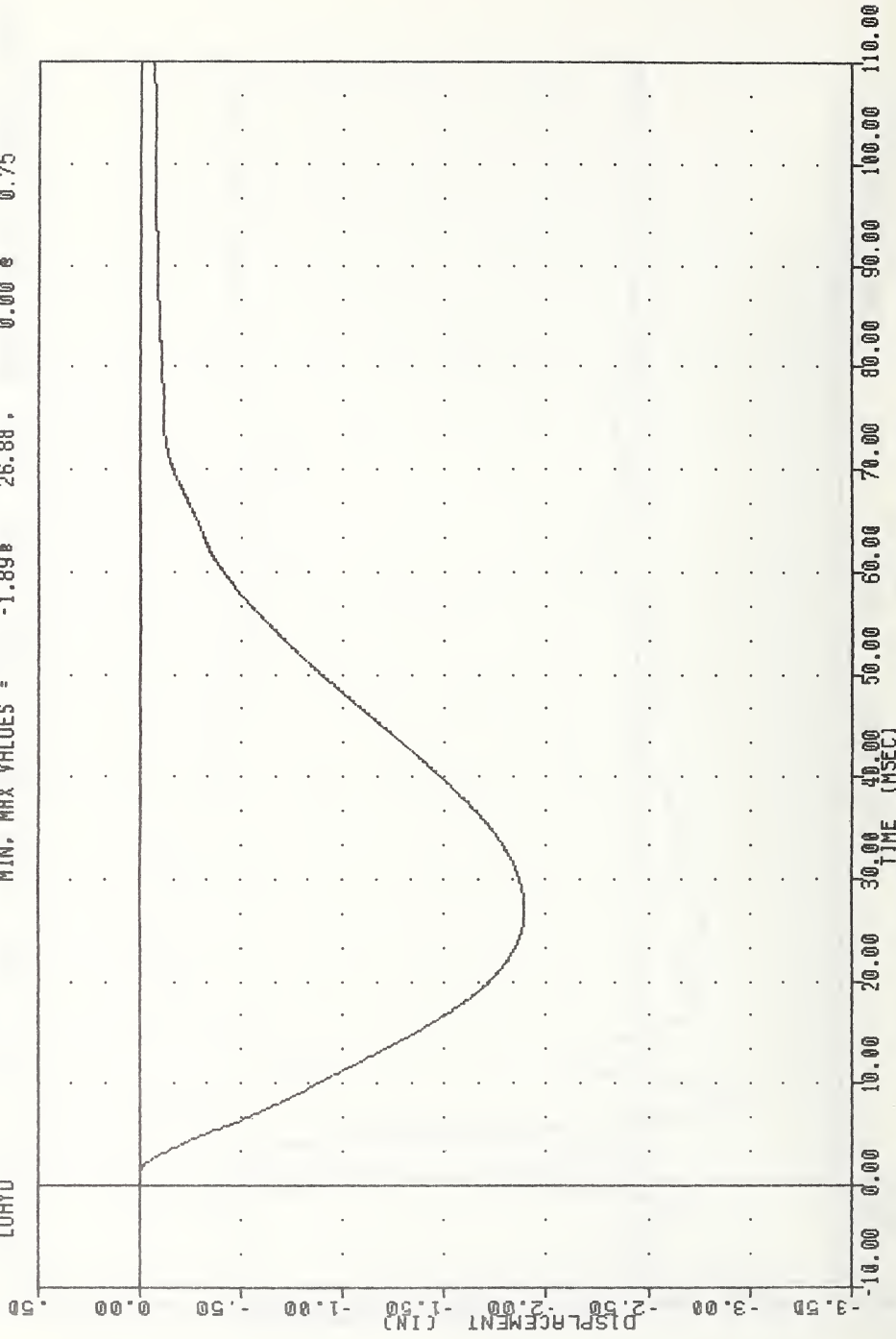
FILTER = HSR1 136/ 189/ -50  
MIN, MAX VALUES = -80.65 2.50 21.45 8.13



BIOSID DUMMY CALIBRATION - LEFT ABDOMEN RIB IMPACT  
LEFT LOWER ABDOMEN ACCELERATION Y AXIS

VRIC , B02C8A81  
BIOSID SN02 ABDOMEN IMP CAL08  
91134  
LWAYD

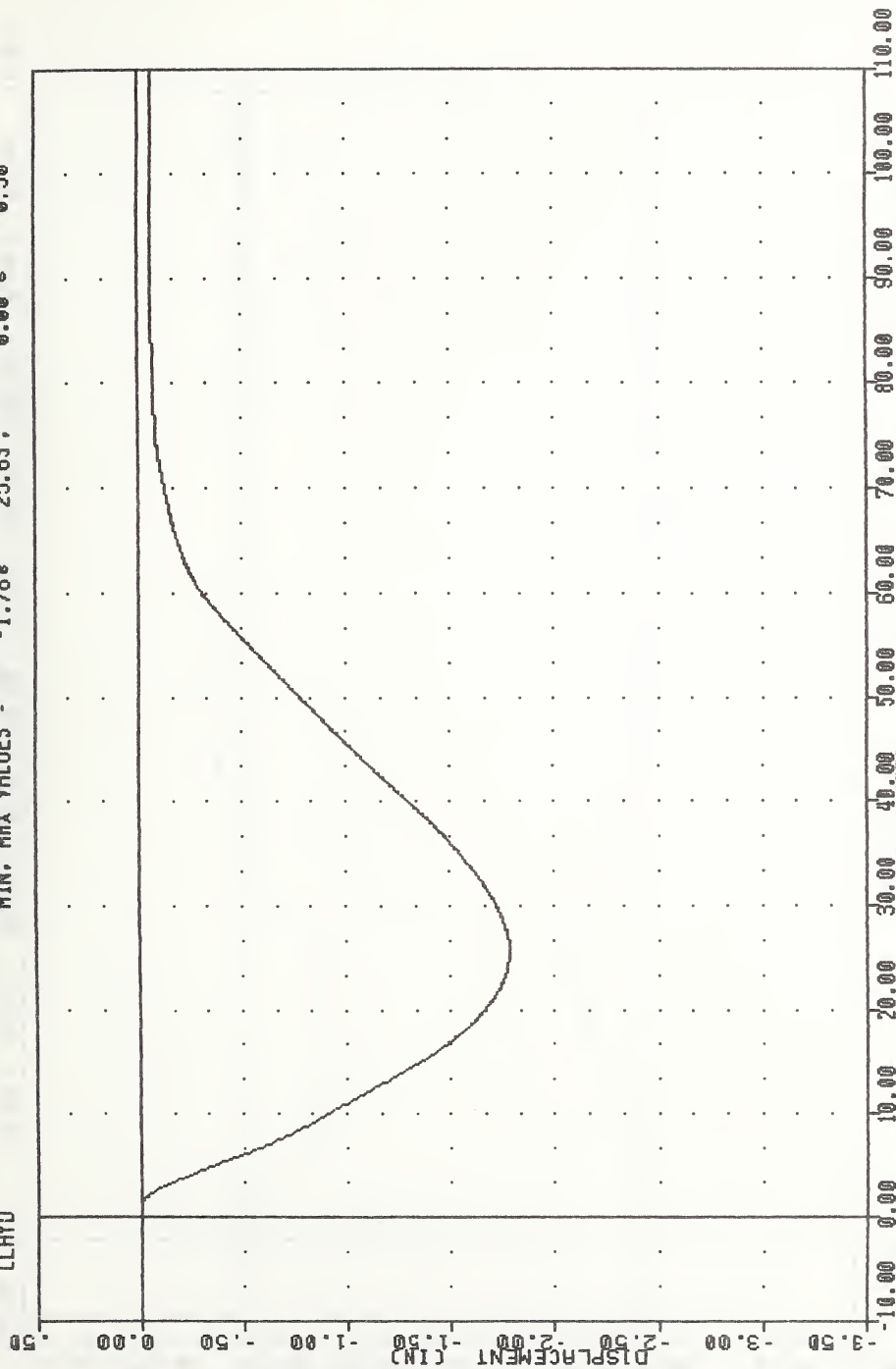
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = 26.88, 0.00 e 0.75



BIOSID DUMMY CALIBRATION - LEFT ABDOMEN RIB IMPACT  
LEFT UPPER ABDOMEN DEFLECTION Y AXIS

VRTC , B02C0881  
 BIOSID SN02 ABDOMEN IMP CAL00  
 91134  
 LLAYD

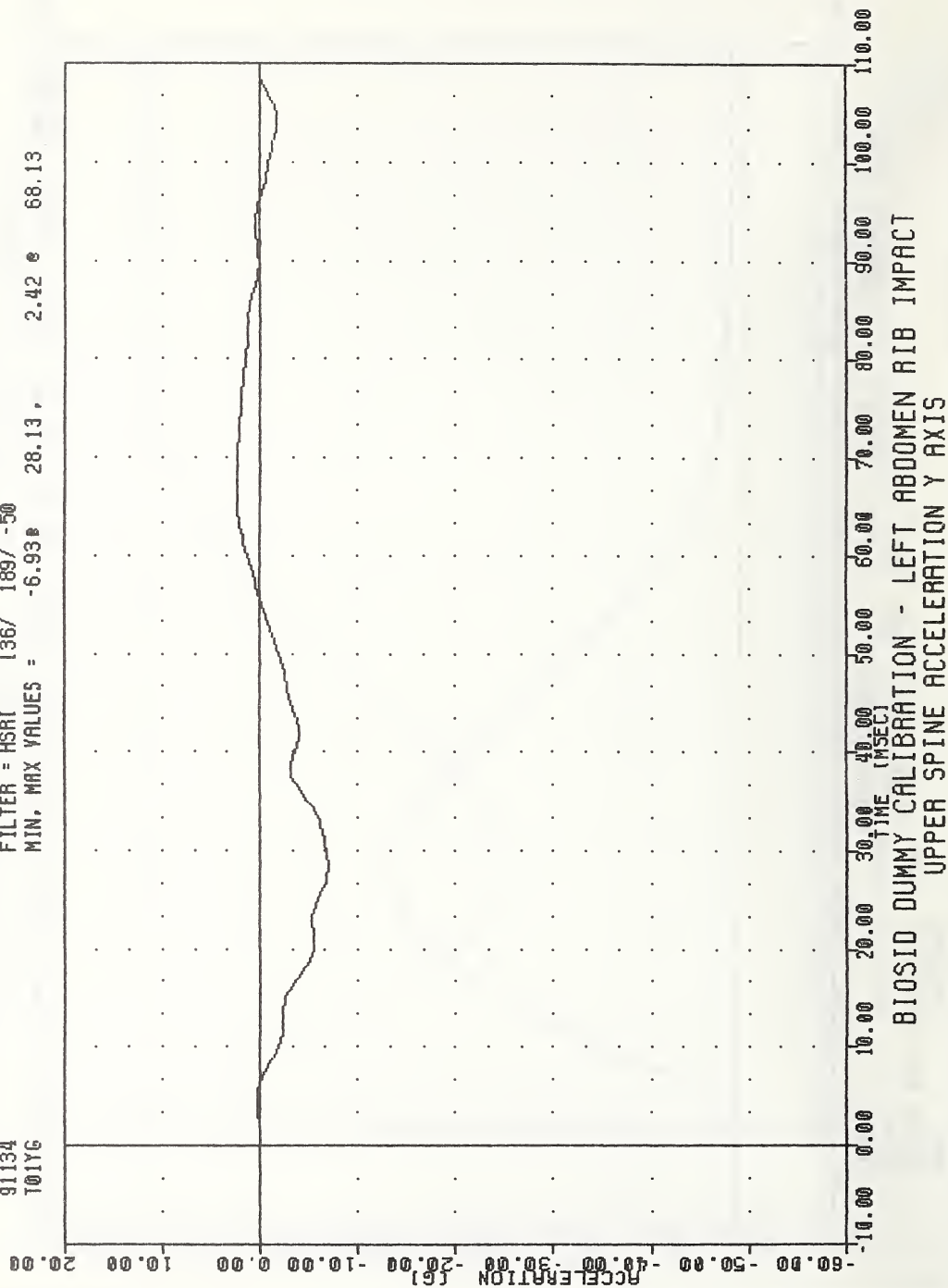
FILTER = BLPP 300/ 750/ -16  
 MIN, MAX VALUES = 0.00 e 0.50



BIOSID DUMMY CALIBRATION - LEFT ABDOMEN RIB IMPACT  
 LEFT LOWER ABDOMEN DEFLECTION Y AXIS

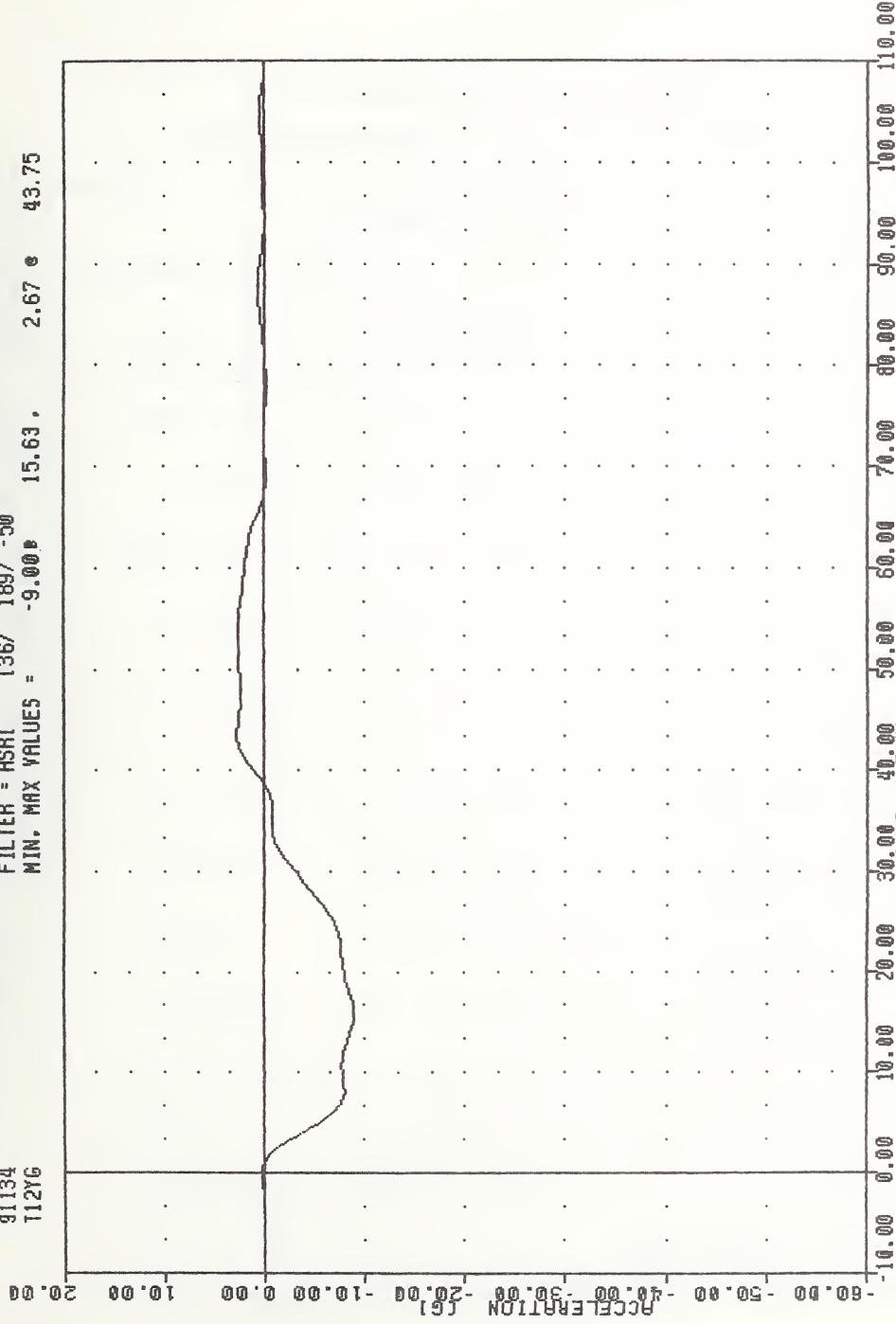
VRTC , B02C8AB1  
BIOSID SNO3 ABDOMEN IMP CAL08  
91134  
101YG

FILTER = HSRI 136/ 189/ -50  
MIN, MAX VALUES = -6.93 28.13, 2.42 68.13



VRTC  
BIOSID SN02 ABDOMEN IMP CAL08  
91134  
112YG

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -9.00 15.63 2.67 43.75



BIOSID DUMMY CALIBRATION - LEFT ABDOMEN RIB IMPACT  
LOWER SPINE ACCELERATION Y AXIS



TRANSPORTATION RESEARCH CENTER OF OHIO  
THORAX IMPACT WITH ARMS - LINEAR IMPACTOR TEST

BIOSID DUMMY

15-May-91

LEFT SIDE CONFIGURATION

VRTC

B02C8TA1

BIOSID SN02 THORAX-ARM CAL08

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	55.00 %
PENDULUM VELOCITY	21.56 - 22.44 FT/S	21.77 FT/SEC
IMPACTOR FORCE	1394 - 1709 LB	-1552. LB
PEAK ACCELERATION UPPER THORACIC RIB	55 - 80 G	-73.0 G
PEAK ACCELERATION MID THORACIC RIB	70 - 100 G	-83.4 G
PEAK ACCELERATION LOWER THORACIC RIB	85 - 128 G	-109.1 G
PEAK DISPLACEMENT UPPER THORACIC RIB	0.83 - 1.14 IN	-0.99 IN
PEAK DISPLACEMENT MID THORACIC RIB	1.26 - 1.65 IN	-1.52 IN
PEAK DISPLACEMENT LOWER THORACIC RIB	1.65 - 2.09 IN	-1.84 IN
PEAK ACCELERATION UPPER SPINE	34 - 43 G	-37.8 G
PEAK ACCELERATION LOWER SPINE	14 - 21 G	-15.4 G
PEAK DISPLACEMENT SHOULDER	0.59 - 1.06 IN	-0.83 IN

TEST MEETS SPECIFICATIONS

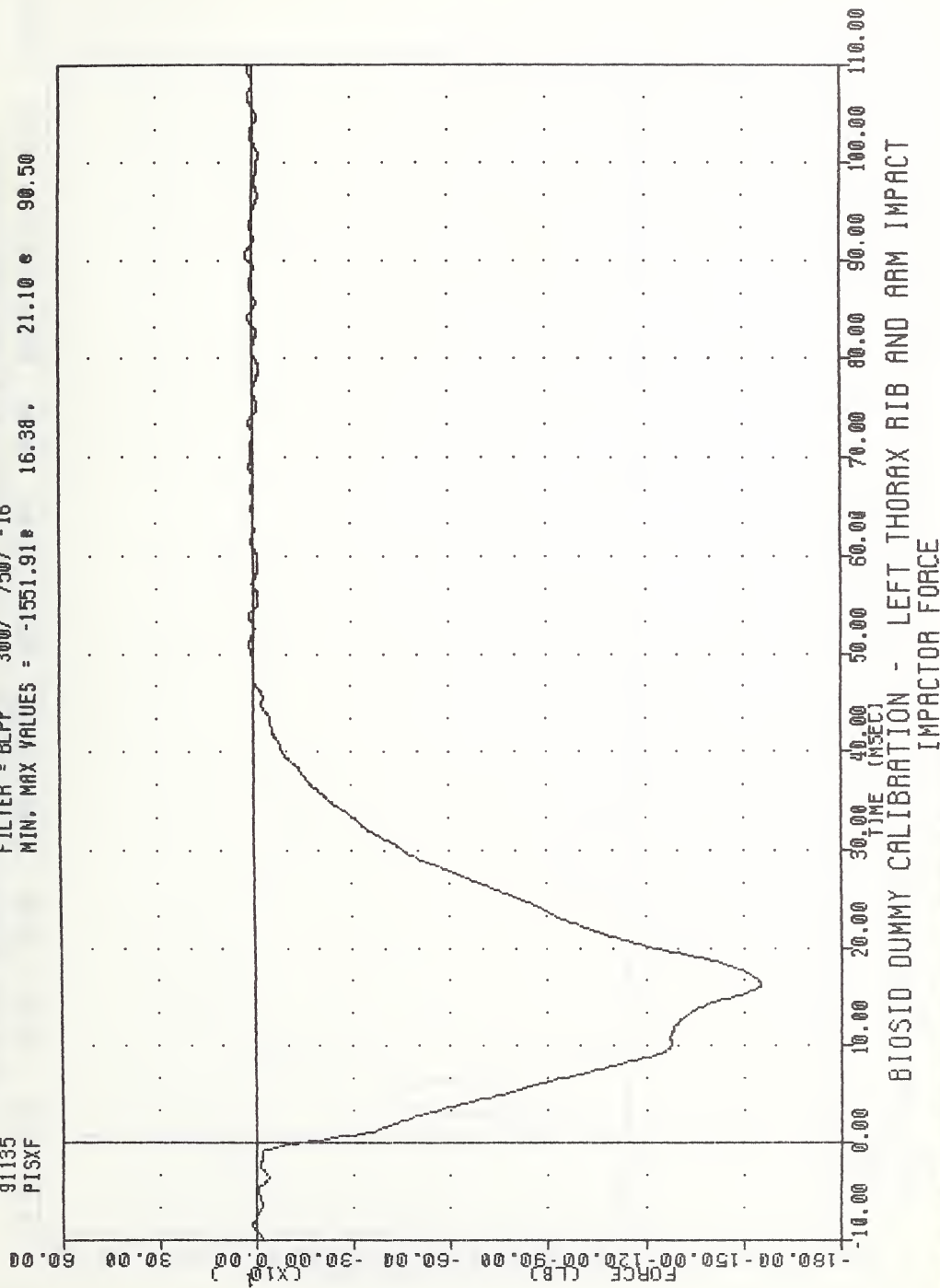
TECHNICIAN

*Chas. Middleton*

VRTC , B02C8TA1  
BIOSID SN02 THORAX-ARM CAL08  
91135  
PISXF

FILTER = BLPP 300/ 750/ -16

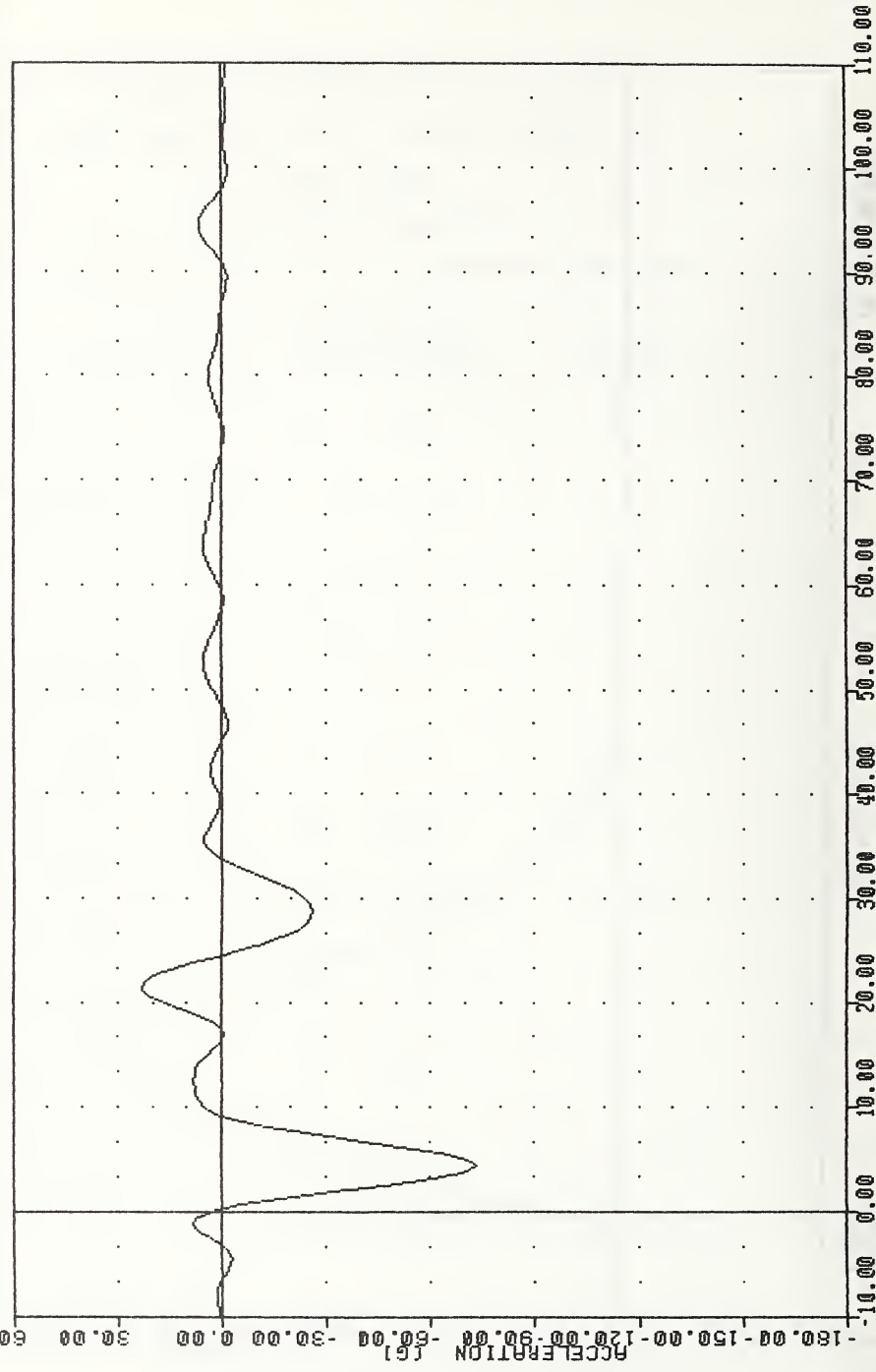
MIN. MAX VALUES = -1551.91# 16.38. 21.10 # 90.50



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
IMPACTOR FORCE

VRIC  
BIOSID SN02 THORAX-ARM CAL00  
91135  
LURYG

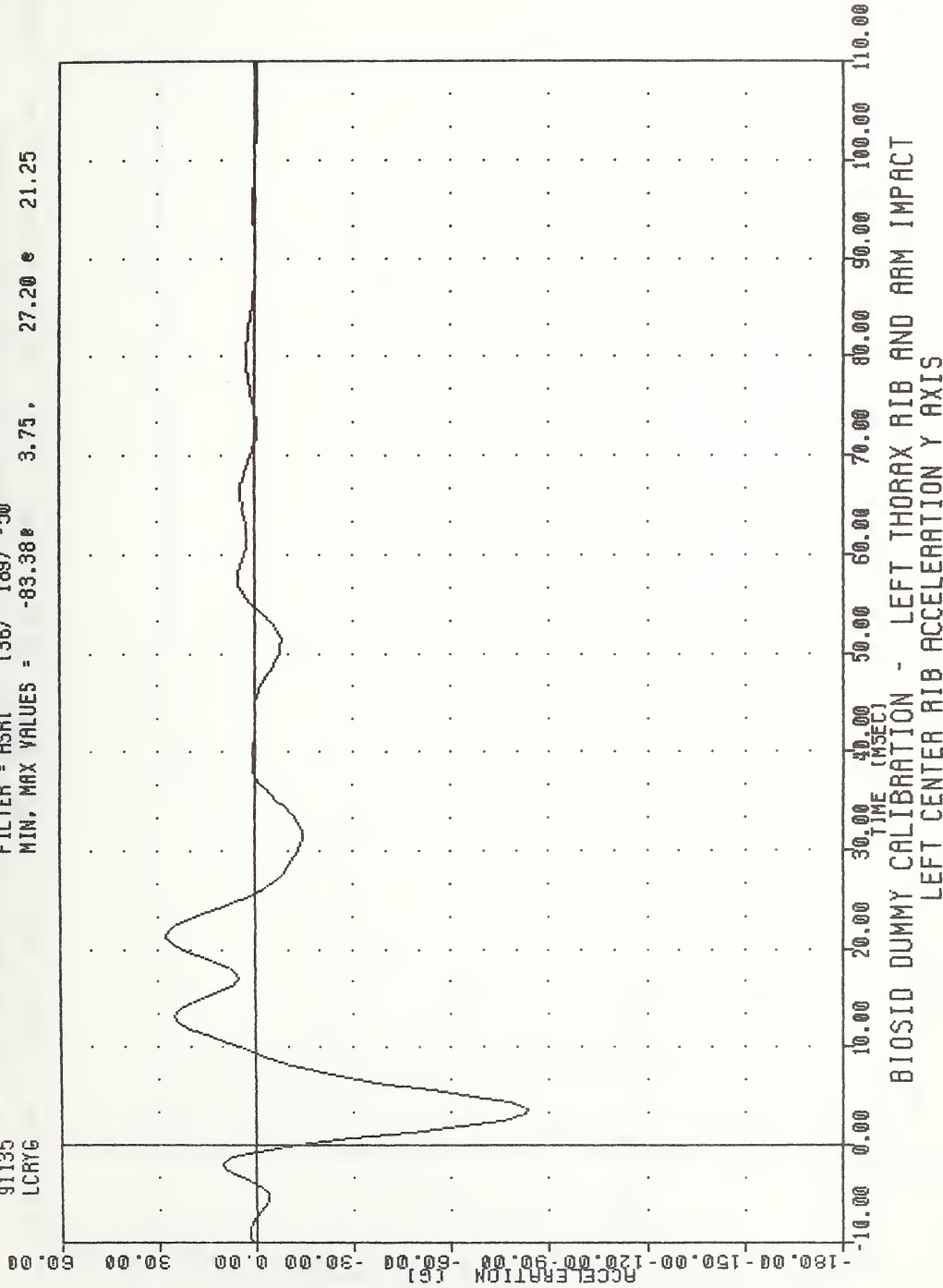
FILTER = HSRI 136/ 189/ -50  
MIN, MAX VALUES = -73.04e 4.38, 22.65 e 21.25



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
LEFT UPPER RIB ACCELERATION Y AXIS

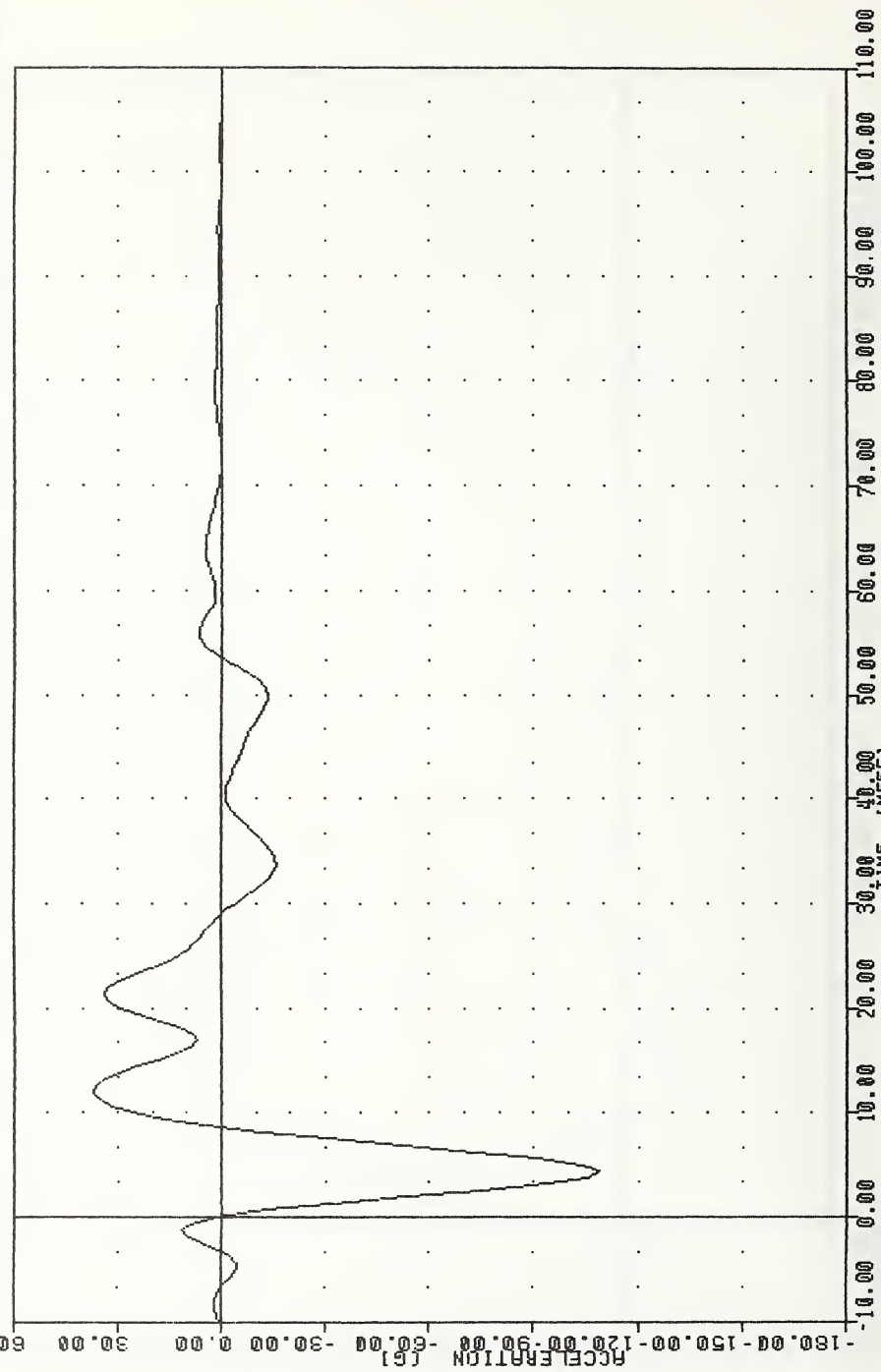
NRTC , B02C08T01  
BIOSID SN02 THORAX-ARM CAL00  
91135  
LCRYG

FILTER = HSR1 136/ 189/ -50  
MIN, MAX VALUES = -83.38 3.75, 27.20 e 21.25



VRIC  
BIOSID SN02 THORAX-ARM CAL08  
91135  
LLAY6

FILTER = HSRI 136/ 189/ -50  
MIN. MAX VALUES = -109.12 4.38 , 36.76 11.88

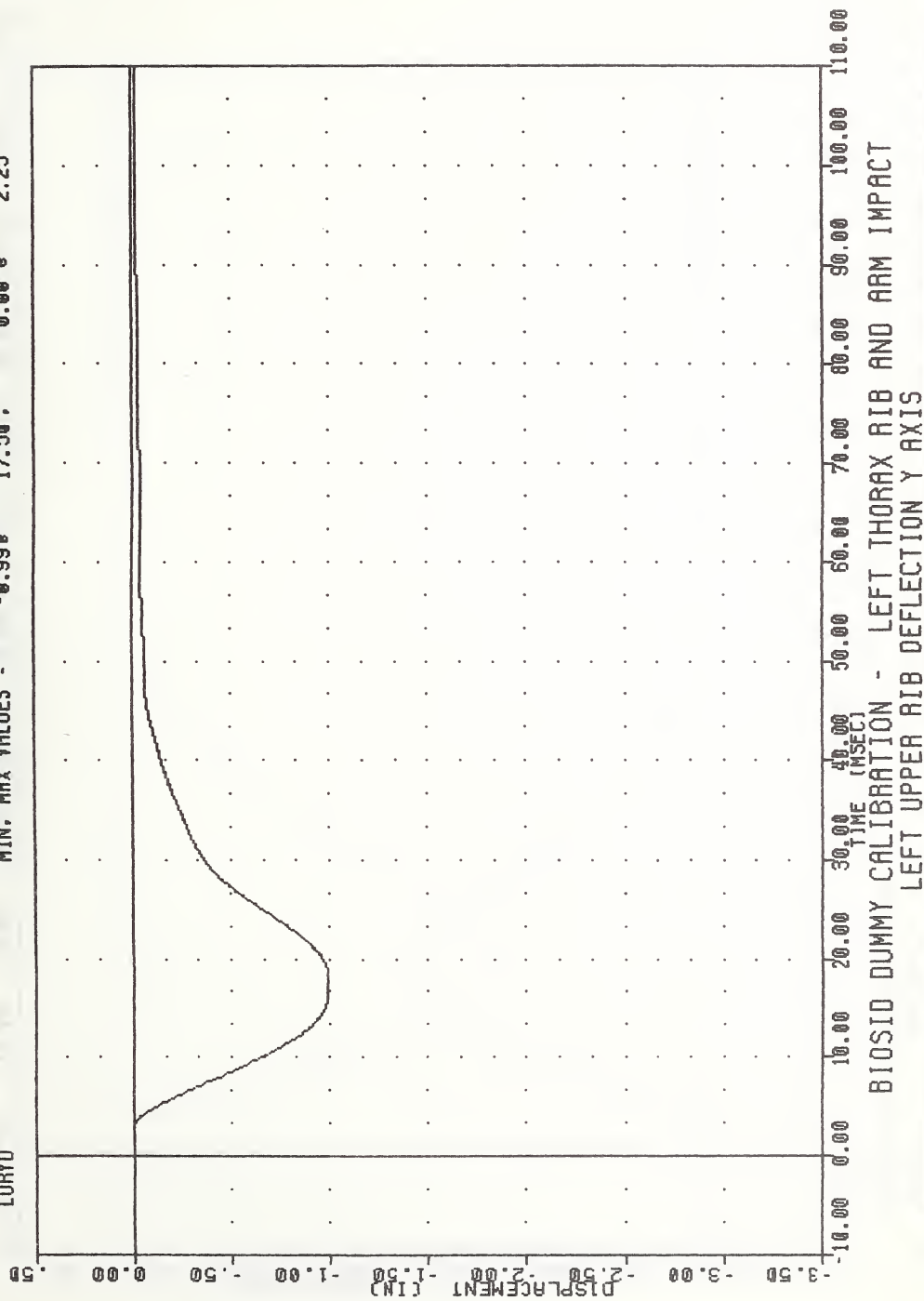


BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
LEFT LOWER RIB ACCELERATION Y AXIS

VRTC  
BIOSID SN02 THORAX-ARM CAL00  
91135  
LURYD

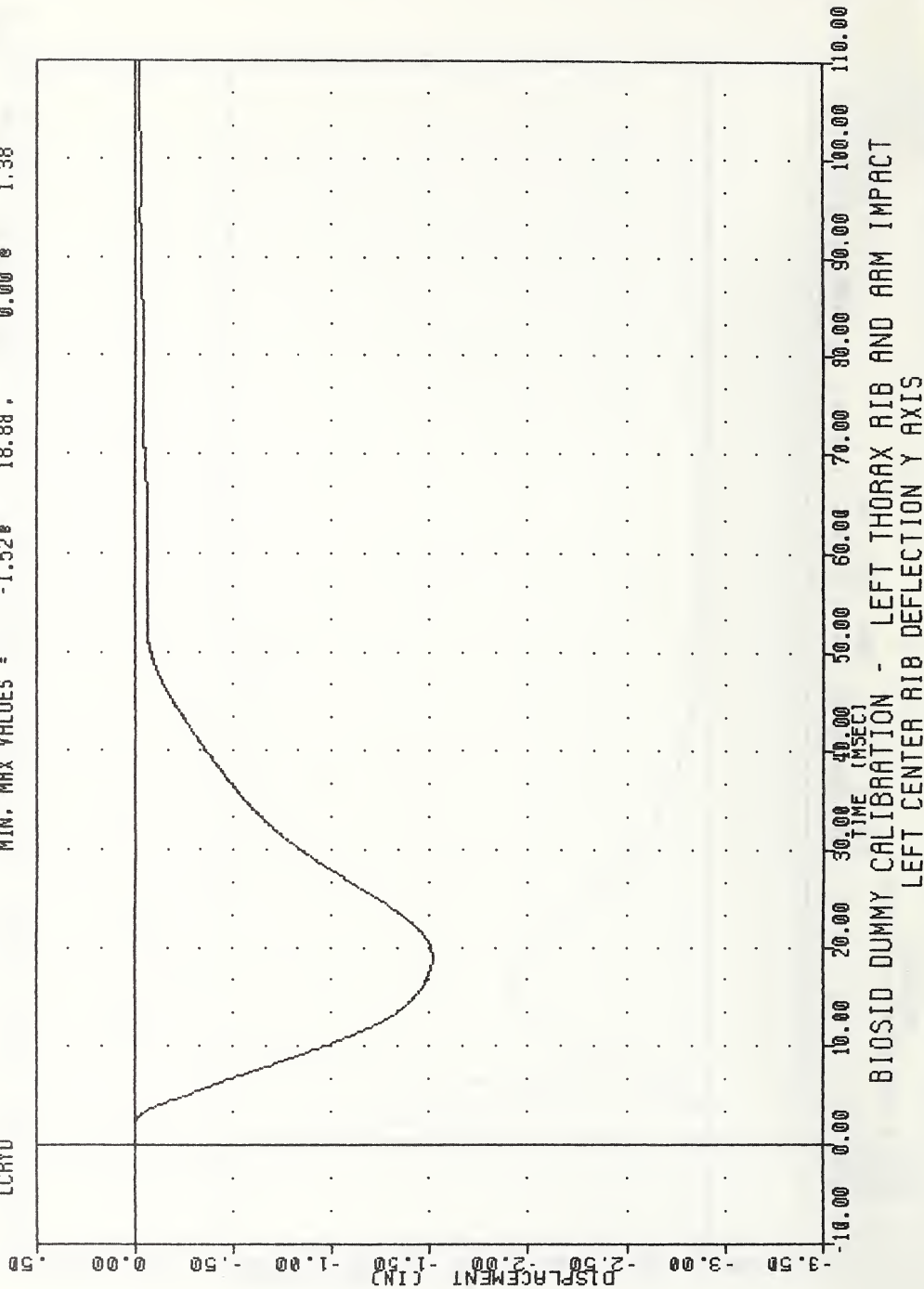
FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -0.99 17.50

0.00 e 2.25



VRTC  
BIOSID SN02 THORAX-ARM CAL00  
91135  
LCRYD

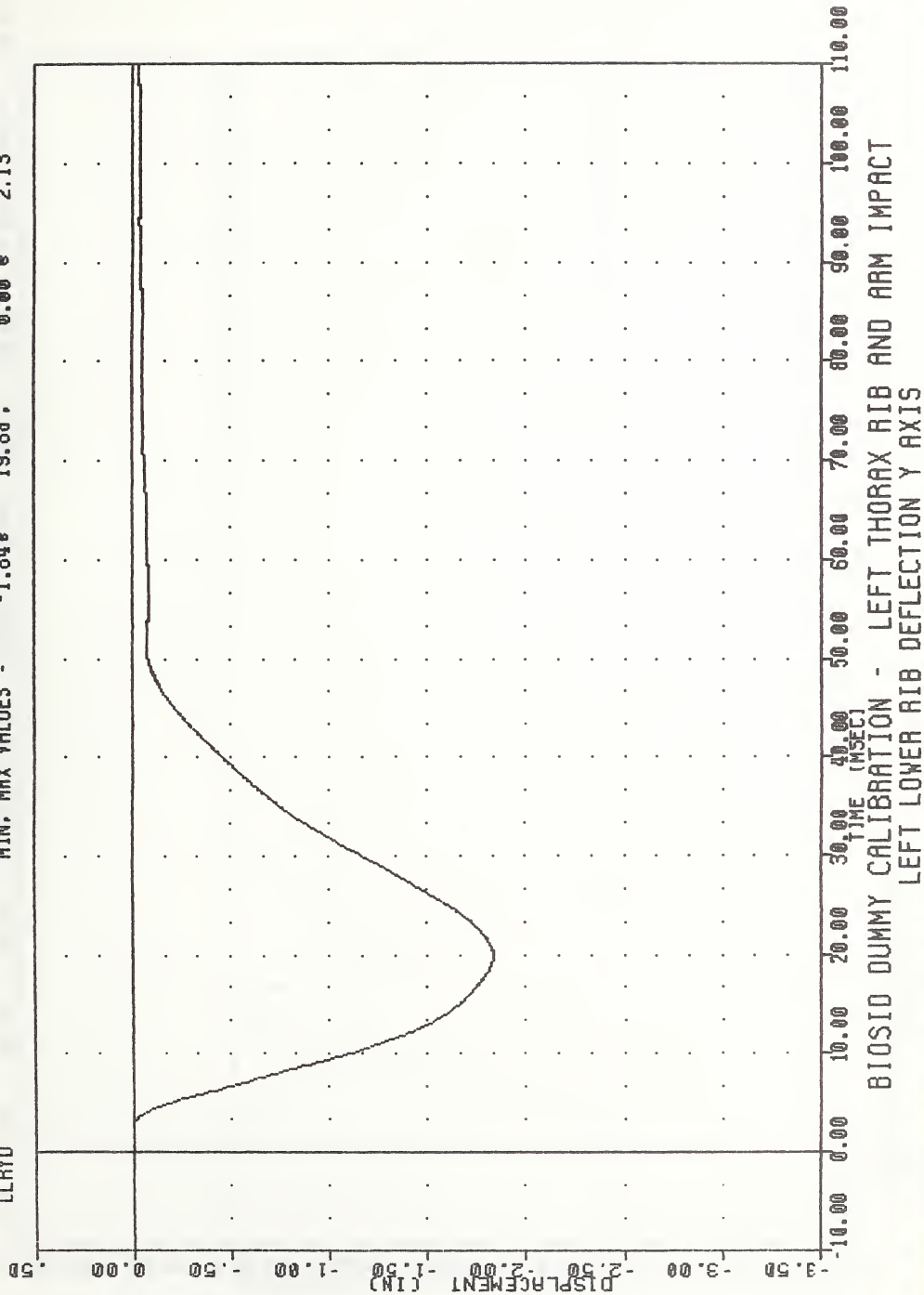
FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = 18.88, 0.00 e 1.38



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
LEFT CENTER RIB DEFLECTION Y AXIS

VRTC , 602C8T81  
BIOSID SN02 THORAX-ARM CAL00  
91135  
LLRYD

FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -1.84e 19.88, 0.00 e 2.13



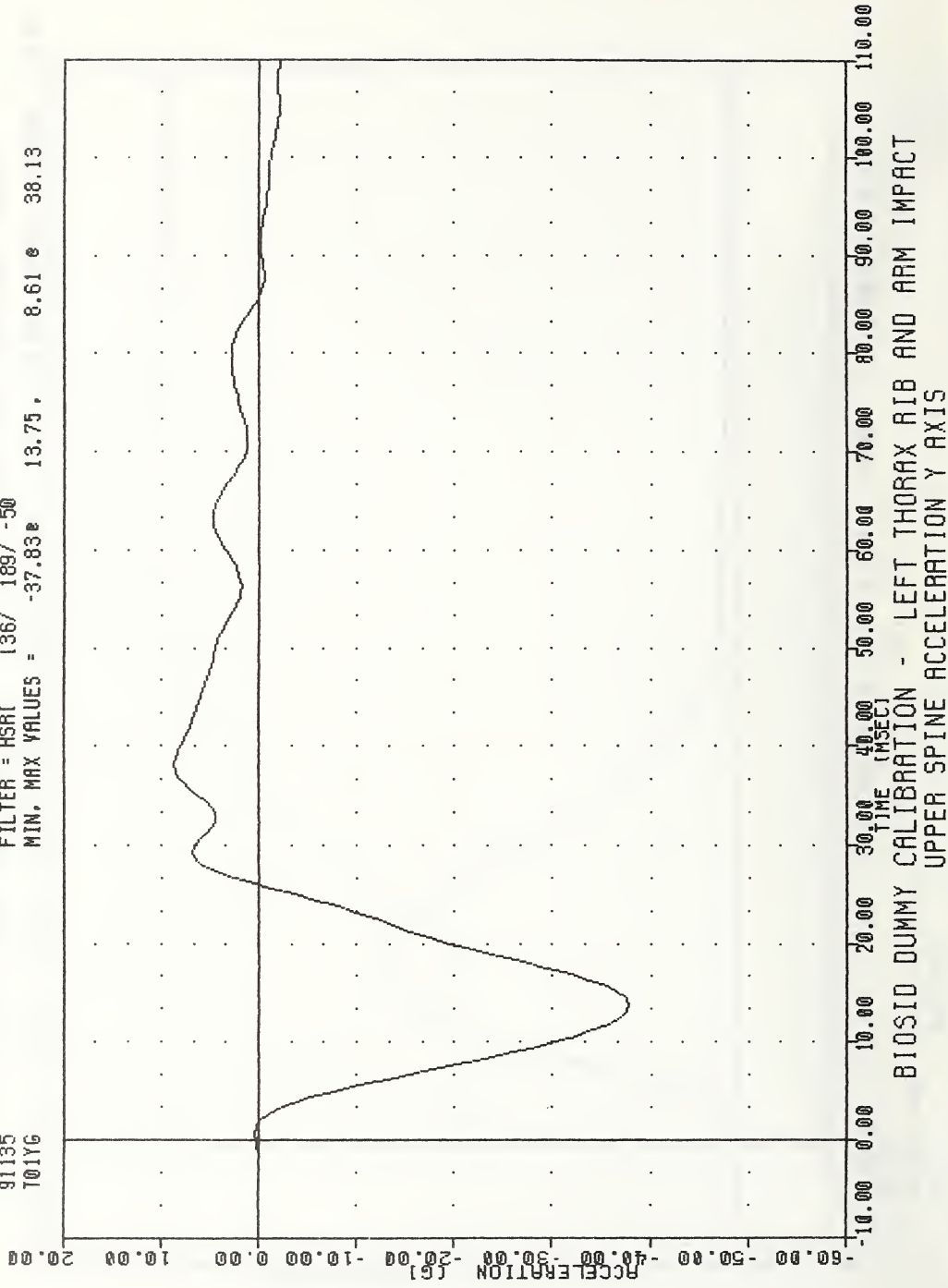


VRTC , B02C8T81  
BIOSID SN02 THORAX-ARM CAL00

91135  
T01YG

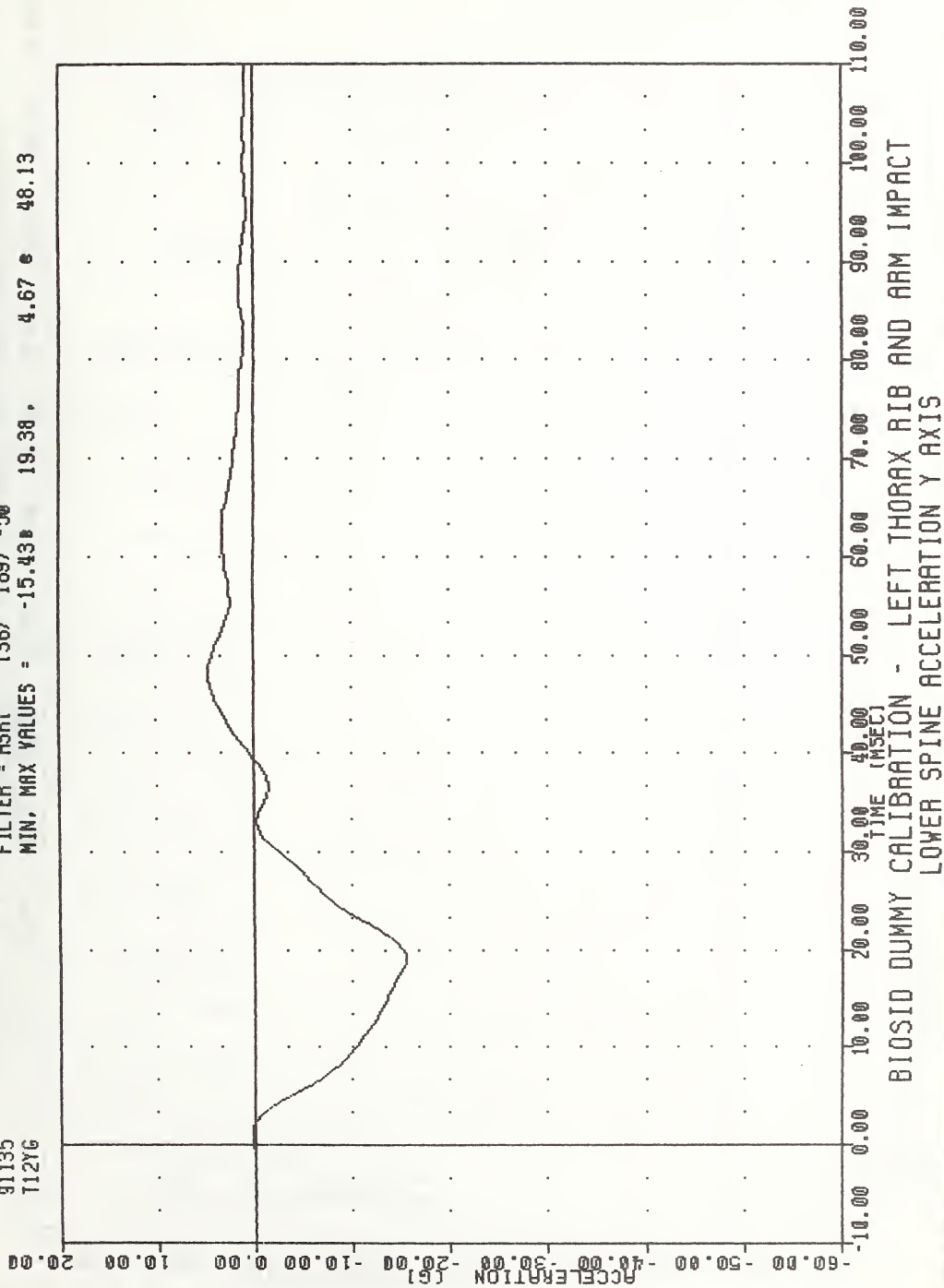
FILTER = HSR1 136/ 189/ -50  
MIN, MAX VALUES = -37.83e 13.75,

8.61 e 38.13



NRIC , B02C8TA1  
BIOSID SN02 THORAX-ARM CAL00  
91135  
T12YG

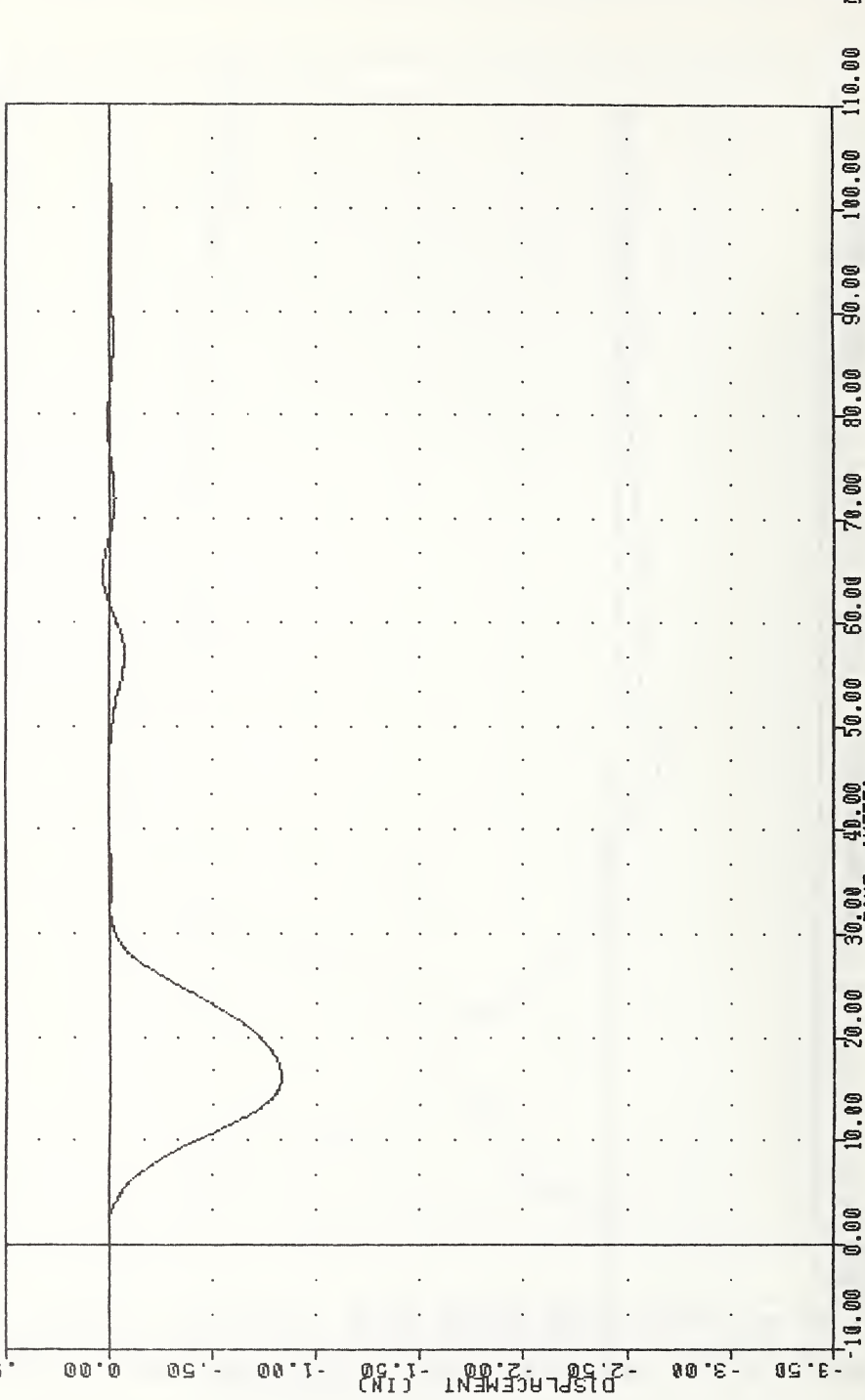
FILTER = HSR1 136/ 189/ -50  
MIN, MAX VALUES = -15.43 19.38 4.67 e 48.13



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
LOWER SPINE ACCELERATION Y AXIS

VRTC  
BIOSID SNO2 THORAX-ARM CAL00  
91135  
SHLYD

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -0.83 16.00 0.03 64.63



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB AND ARM IMPACT  
LEFT SHOULDER DEFLECTION Y AXIS

TRANSPORTATION RESEARCH CENTER OF OHIO  
THORAX IMPACT WITHOUT ARMS - LINEAR IMPACTOR TEST

BIOSID DUMMY

14-May-91

LEFT SIDE CONFIGURATION

VRTC

B02C8TR2

BIOSID SN02 THORAX-RIB CAL08

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	72.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	57.00 %
PENDULUM VELOCITY	21.56 - 22.44 FT/S	21.92 FT/SEC
IMPACTOR FORCE	1169 - 1416 LBS	-1266. LB
PEAK ACCELERATION UPPER THORACIC RIB	133 - 179 G	-165.7 G
PEAK ACCELERATION MID THORACIC RIB	133 - 179 G	-161.0 G
PEAK ACCELERATION LOWER THORACIC RIB	133 - 179 G	-176.2 G
PEAK DISPLACEMENT UPPER THORACIC RIB	1.97 - 2.76 IN	-2.25 IN
PEAK DISPLACEMENT MID THORACIC RIB	1.97 - 2.76 IN	-2.51 IN
PEAK DISPLACEMENT LOWER THORACIC RIB	1.97 - 2.76 IN	-2.47 IN
PEAK ACCELERATION UPPER SPINE	19.5 - 24.5 G	-19.5 G
PEAK ACCELERATION LOWER SPINE	12.0 - 16.5 G	-14.3 G

TEST MEETS SPECIFICATIONS

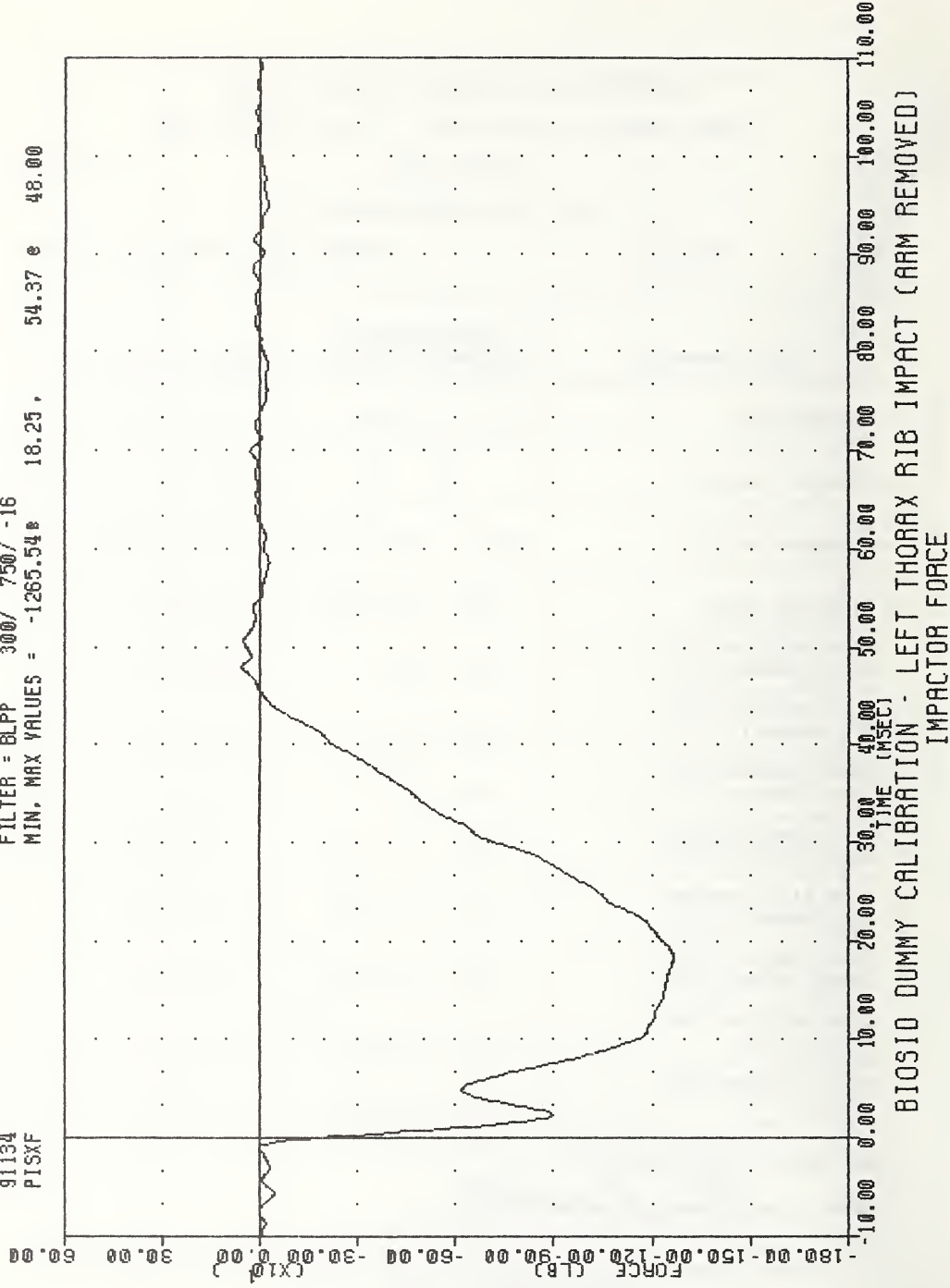
TECHNICIAN

*Chris Middleton*

VRTC , B02C08TR2  
BIOSID SN02 THORAX-RIB CAL00  
91134  
PISXF

FILTER = BLPP 300/ 750/ -16

MIN, MAX VALUES = -1265.54e 18.25, 54.37 e 48.00

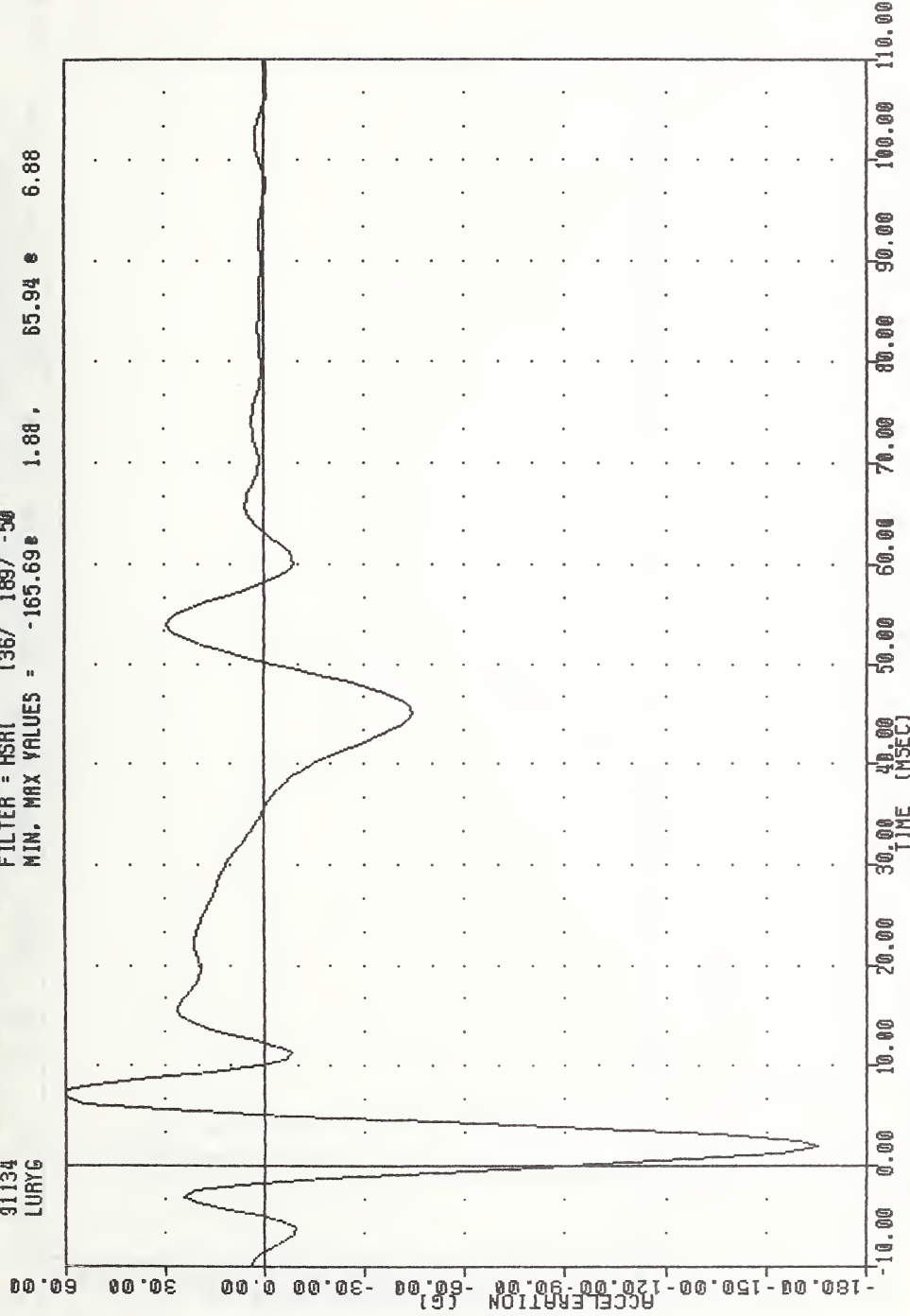


BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
IMPACTOR FORCE

VRTC , B02C8TR2  
BIOSID S002 THORAX-RIB CAL00  
31134  
LURYG

FILTER = HSRI 136/ 189/ -50  
MIN. MAX VALUES = -165.69 1.88

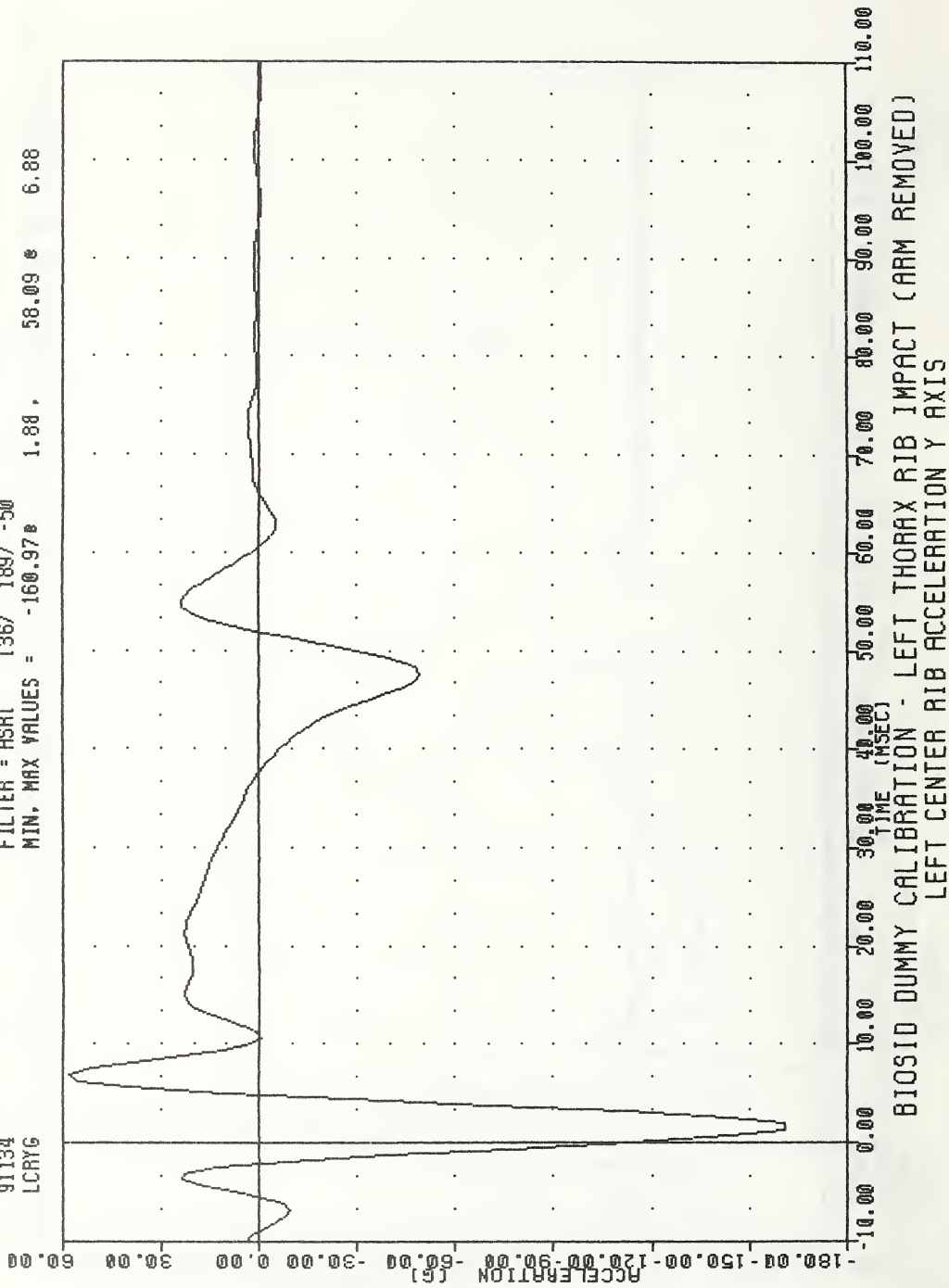
65.94 6.88



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
LEFT UPPER RIB ACCELERATION Y AXIS

VRTC  
BIOSID SN02 THORAX-RIB CAL00  
91134  
LCRYG

FILTER = HSRI 136/ 189/ -50  
MIN. MAX VALUES = -160.97 1.88 58.09 6.88

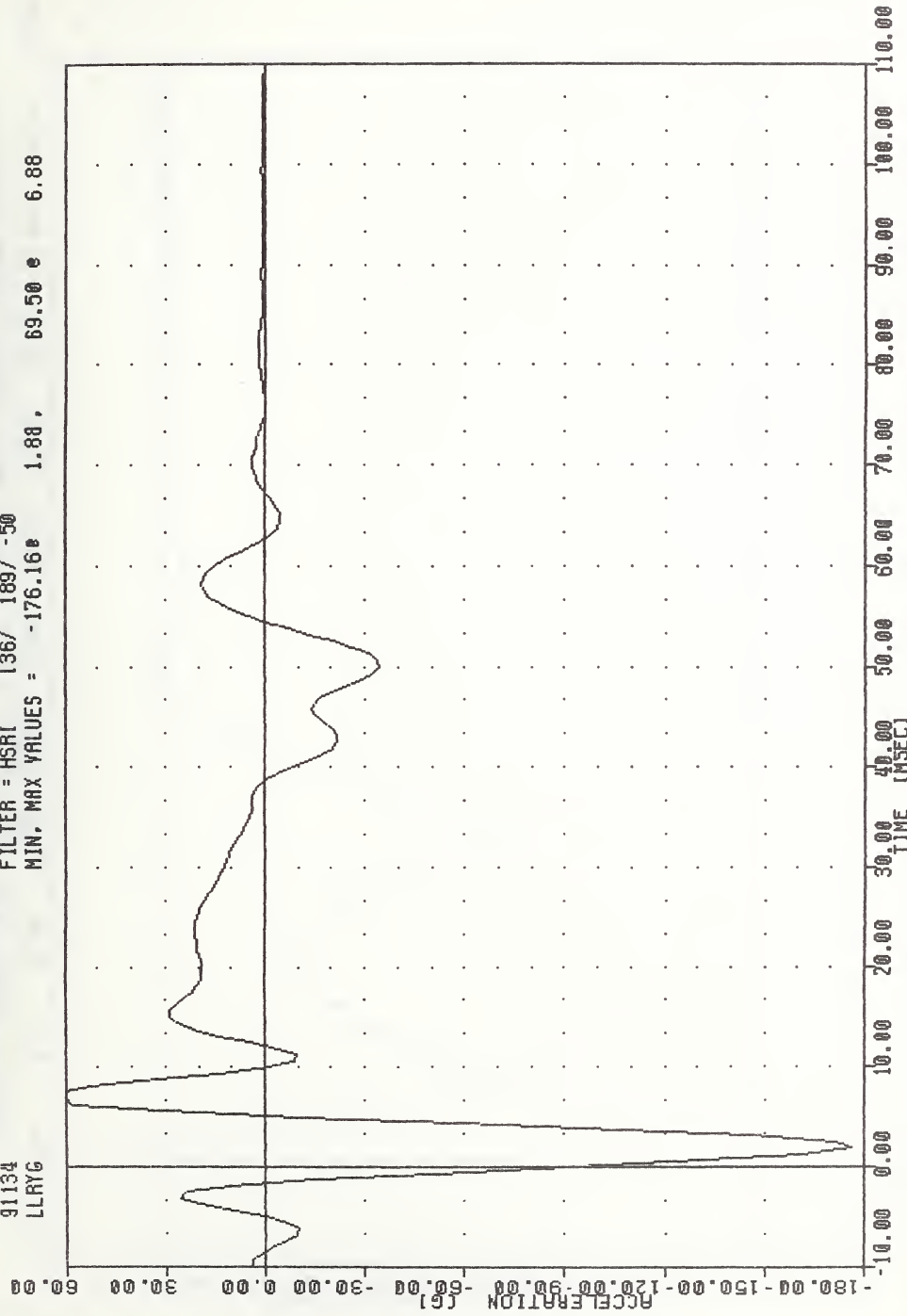


BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
LEFT CENTER RIB ACCELERATION Y AXIS



VRTC  
BIOSID SN02 THORAX-RIB CAL00  
91134  
LLRYG

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -176.16 1.88  
69.50 6.88



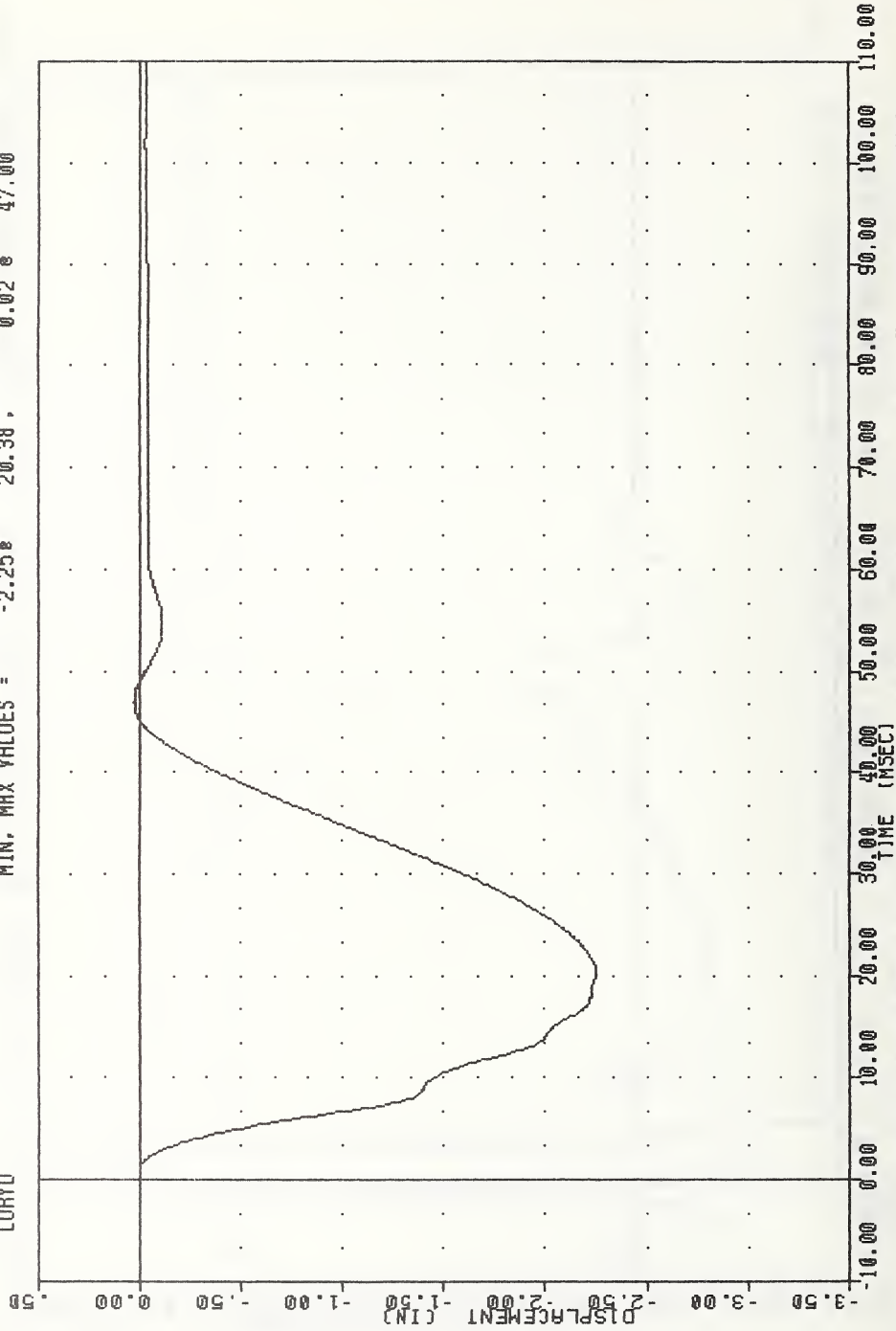
BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
LEFT LOWER RIB ACCELERATION Y AXIS



VRTC , B02C8TR2  
BIOSID SN02 THORAX-RIB CAL08  
91134  
LURYD

FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -2.25 20.38

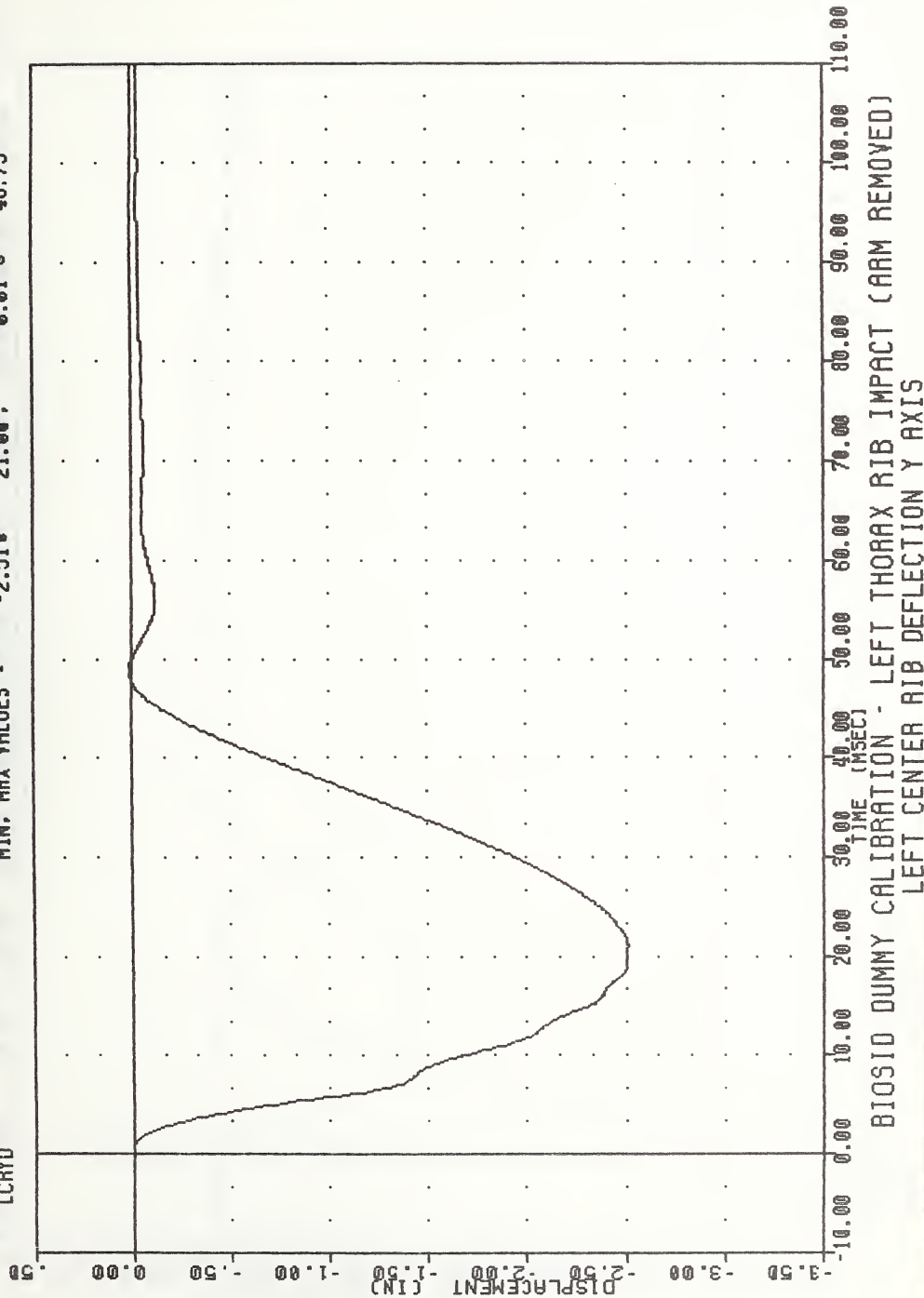
0.02 47.00



BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
LEFT UPPER RIB DEFLECTION Y AXIS

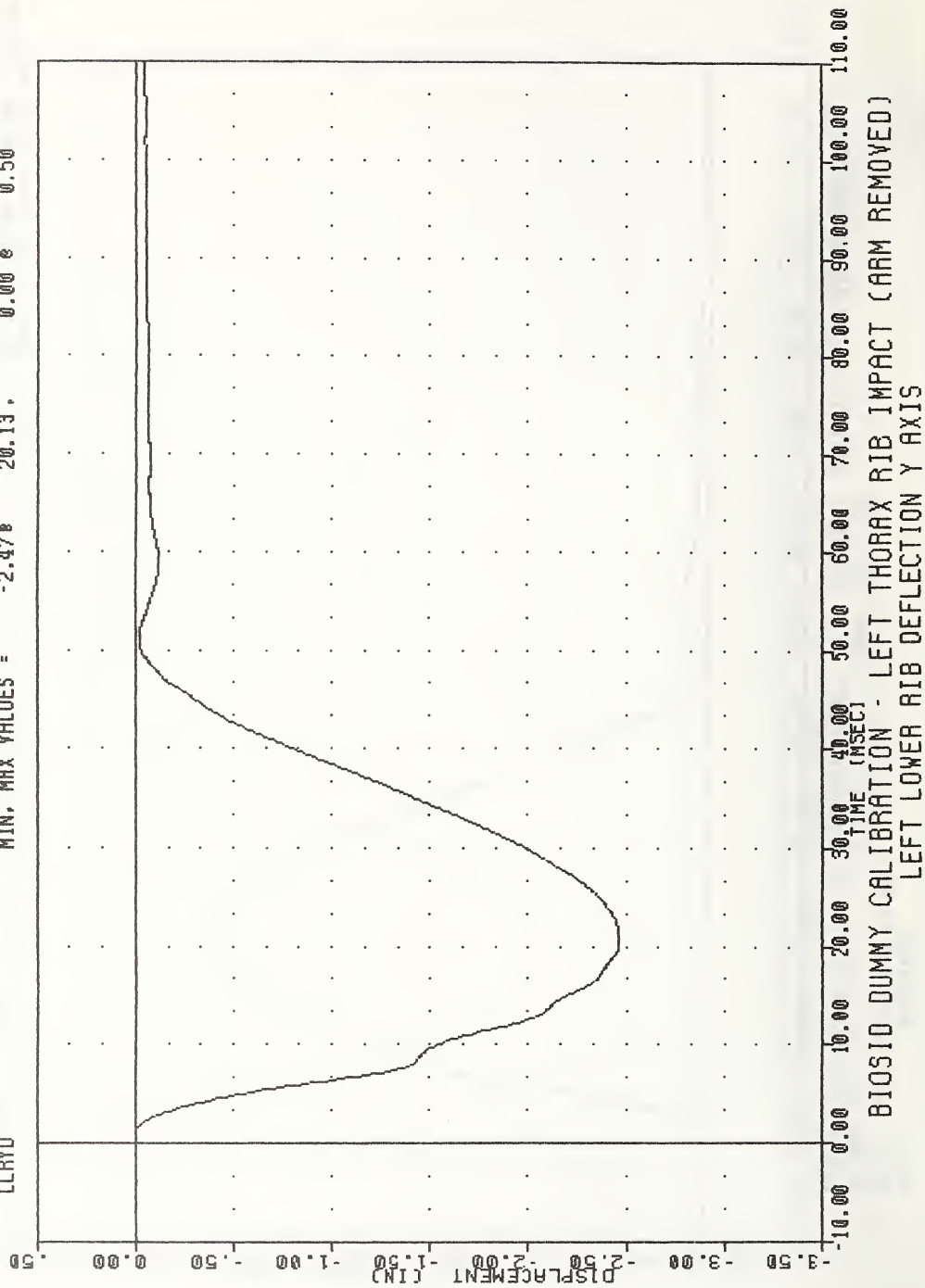
VRTC  
BIOSID SN02 THORAX-RIB CAL00  
91134  
LCRYD

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -2.51e 21.00, 0.01 e 48.75



VRTC  
BIOSID SN02 THORAX-RIB CAL00  
91134  
LLRYD

FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -2.47e 20.13, 0.00 e 0.50

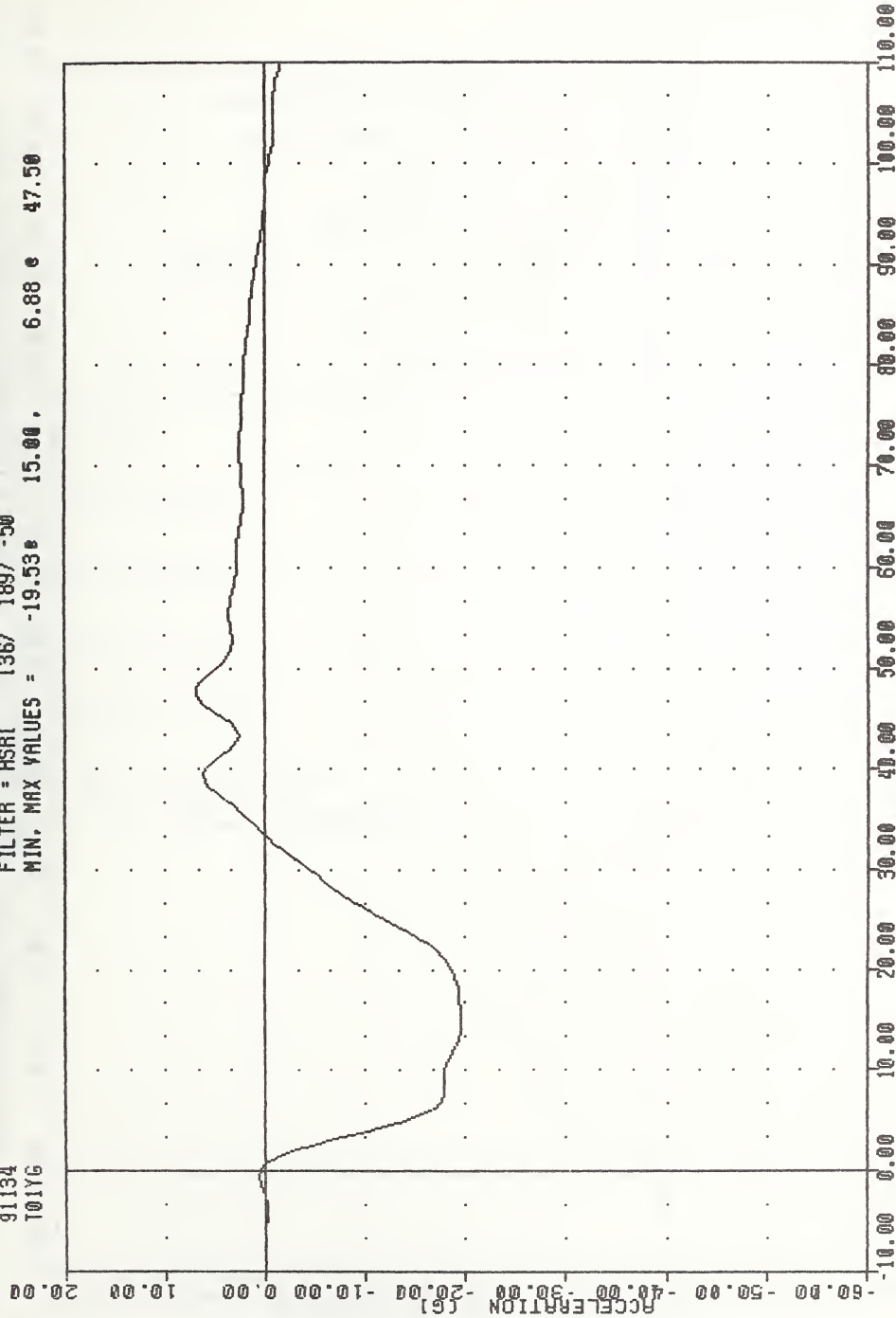


BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
LEFT LOWER RIB DEFLECTION Y AXIS

VRTC , B02C8TR2  
BIOSID SN02 THORAX-RIB CAL00  
91134  
T01YG

FILTER = HSR( 136/ 189/ -50  
MIN. MAX VALUES = -19.53\* 15.00 ,

6.88 \* 47.50

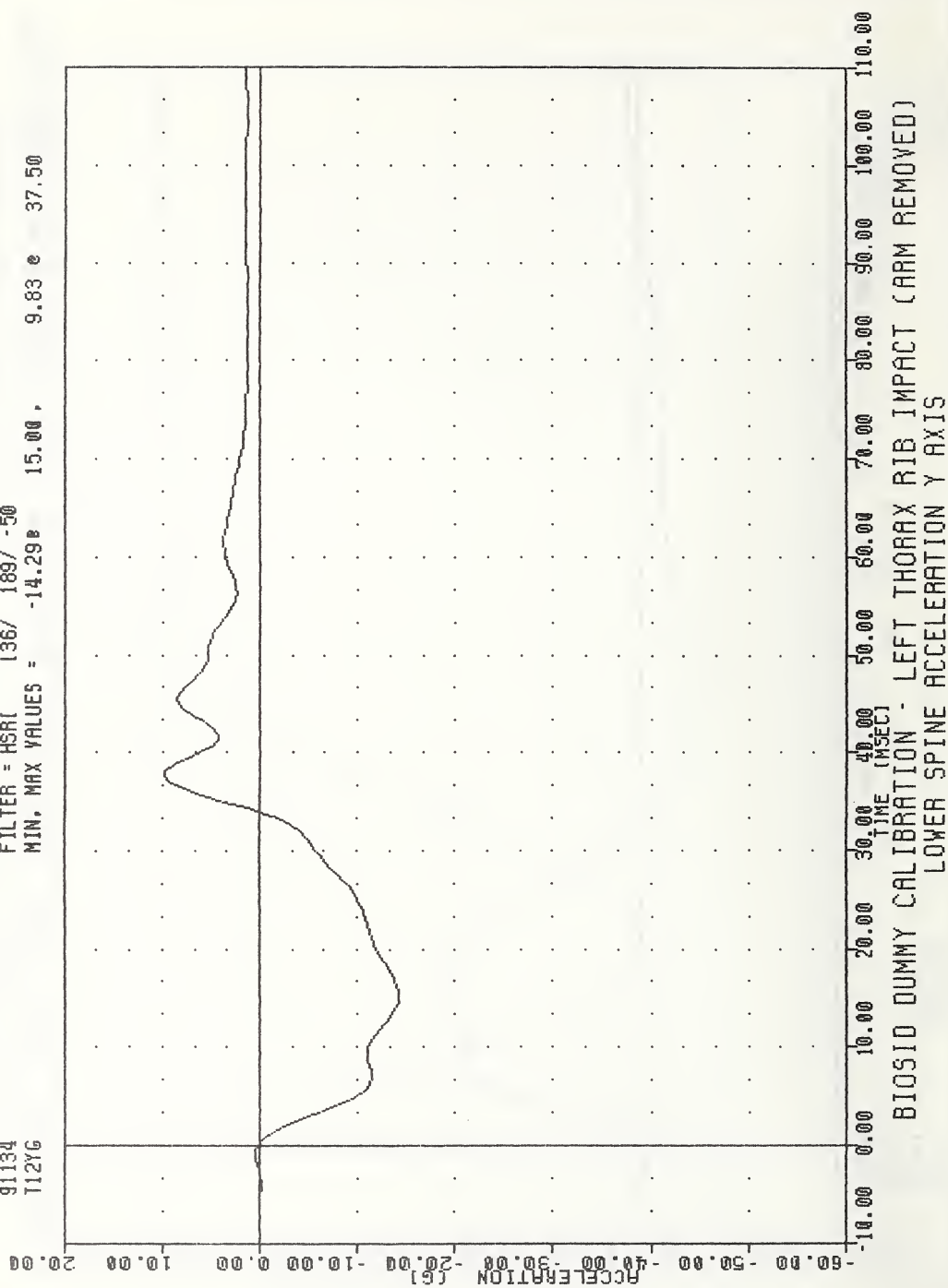


BIOSID DUMMY CALIBRATION - LEFT THORAX RIB IMPACT (ARM REMOVED)  
UPPER SPINE ACCELERATION Y AXIS

VRTC  
BIOSID SN02 THORAX-RIB CAL08  
91134  
T112YG

FILTER = HSR1 136/ 189/ -50  
MIN. MAX VALUES = -14.29e 15.00e

9.83 e 37.50



## TRANSPORTATION RESEARCH CENTER OF OHIO

## PELVIS IMPACT -- LINEAR IMPACTOR TEST

BIOSID DUMMY

15-May-91

## LEFT SIDE CONFIGURATION

VRTC

B02C8PV2

BIOSID SN02 PELVIS IMP CAL08

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
TEMPERATURE	69 - 72 DEG. F	71.00 DEG. F
RELATIVE HUMIDITY	10% - 70%	55.00 %
PENDULUM VELOCITY	21.56 - 22.44 FT/S	21.77 FT/SEC
IMPACTOR FORCE	1731 - 2181 LB	-1812. LB
PEAK ACCELERATION PELVIS	42 - 66 G	-48.6 G

TEST MEETS SPECIFICATIONS

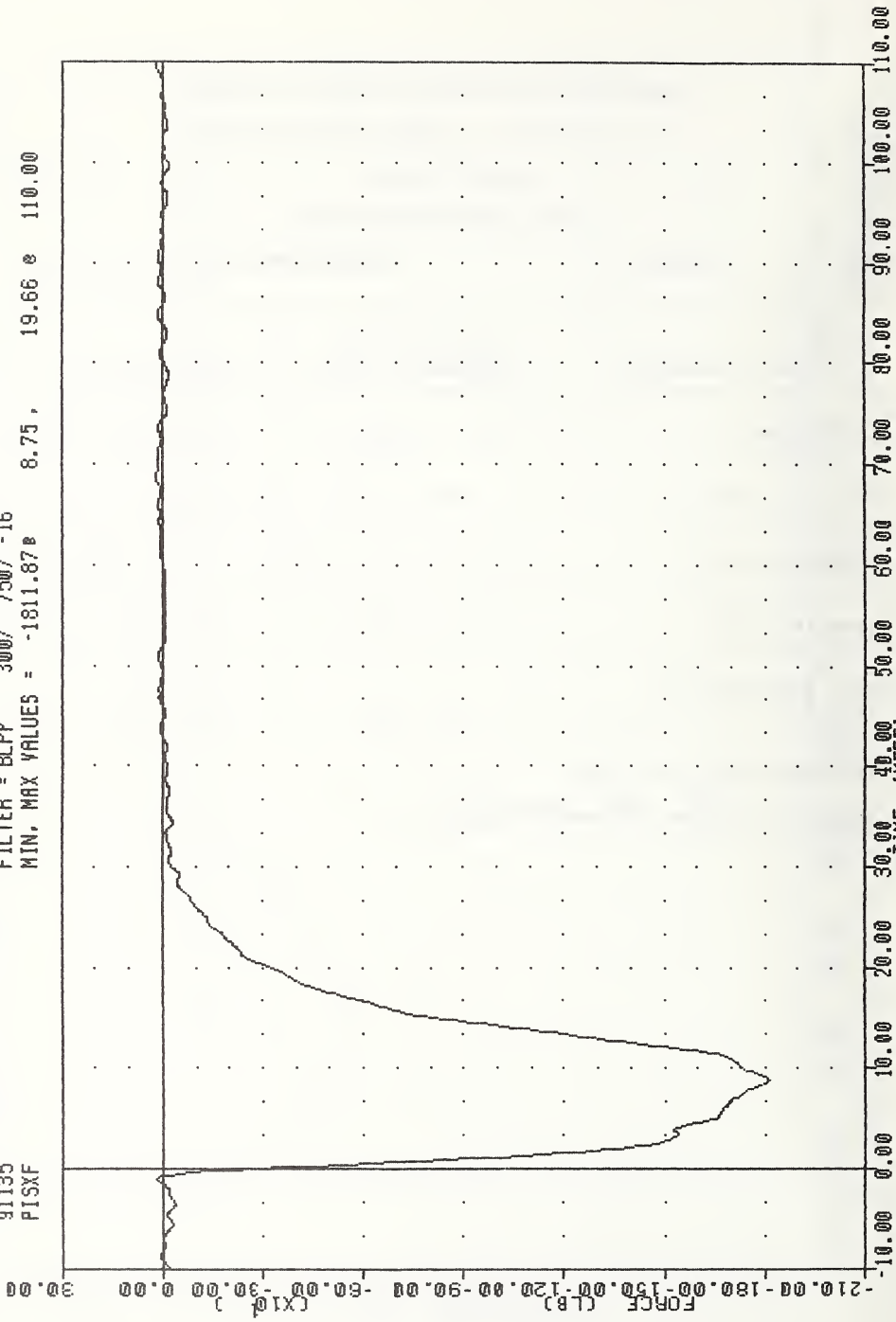
TECHNICIAN

*Chas. Middleton*

VRTC  
BIOSID SN02 PELVIS IMP CAL08  
91135  
PISXF

FILTER = BLPP 300/ 750/ -16  
MIN. MAX VALUES = -1811.878 8.75 ,

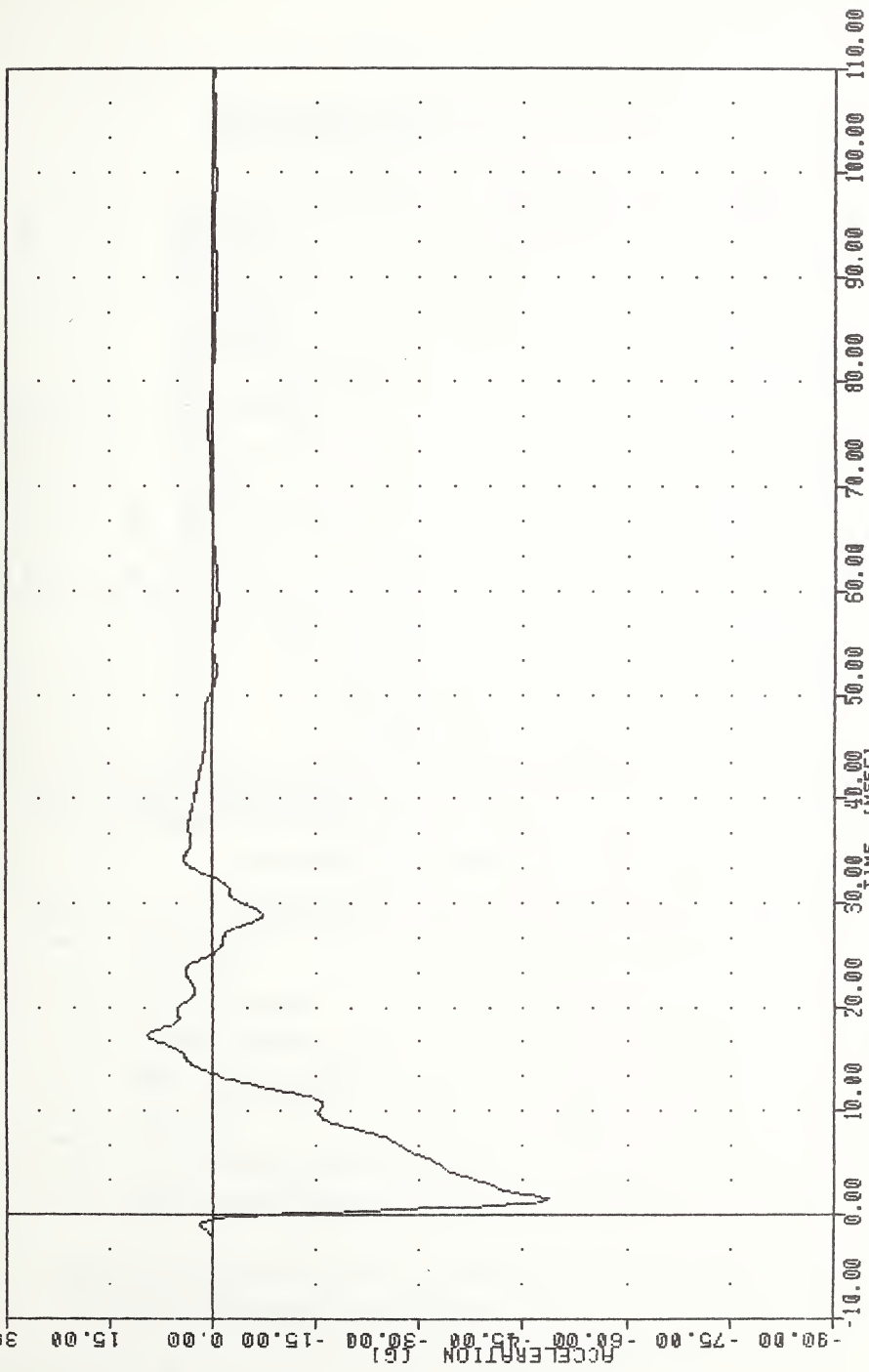
19.66 @ 110.00



BIOSID DUMMY CALIBRATION -- LEFT PELVIS IMPACT TEST  
IMPACTOR FORCE

VRTC , B0208P42  
BIOSID SN02 PELVIS IMP CAL00  
91135  
PEVIG

FILTER = BLPP 300/ 750/ -16  
MIN, MAX VALUES = -48.58 1.50, 9.37 e 17.25



BIOSID DUMMY CALIBRATION -- LEFT PELVIS IMPACT TEST  
LEFT PELVIS ACCELERATION Y AXIS

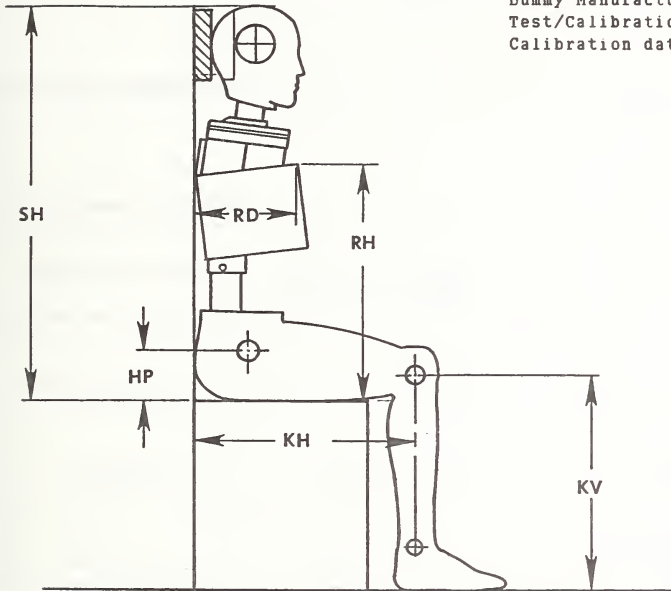


LEFT REAR PASSENGER DUMMY

DUMMY NO.: 905

# SIDE IMPACT DUMMY CONFIGURATION TEST DATA

Dummy Serial No.: 905  
 Dummy Manufacturer: VRTC  
 Test/Calibration No.: CAL05  
 Calibration date: 04/22/91



NOTE: CHEST JACKET IS REMOVED FOR DISTANCE MEASUREMENTS AND IS INCLUDED FOR WEIGHT MEASUREMENT.

## SIDE IMPACT DUMMY CONFIGURATION TEST DATA

SYB	DESCRIPTION	SPECIFICATION	MEASUREMENT
SH	SEATED HEIGHT	35.0 to 35.8	35.2
RH	RIB HEIGHT	19.75 to 20.50	19.8
HP	HIP PIVOT HEIGHT	3.9 REF	3.9
RD	RIB FROM BACKLINE	9.0 to 9.5	9.1
KH	KNEE PIVOT FROM BACKLINE	20.1 to 20.7	20.5
KV	KNEE PIVOT TO FLOOR	19.3 to 19.9	19.6
HW	HIP WIDTH	14.0 to 15.4	14.8
RW	RIB WIDTH FROM CENTERLINE - TOP*	6.5 to 7.1	6.6
RW	RIB WIDTH FROM CENTERLINE - BOTTOM	6.5 TO 7.1	6.6

\*The difference between the top and bottom of the rib wrap should be no more than 0.1 inch.

ALL DISTANCE MEASUREMENTS ARE IN INCHES.

## TRANSPORTATION RESEARCH CENTER OF OHIO

## LATERAL THORAX IMPACT TEST

SIDE IMPACT DUMMY

09-May-91

LEFT SIDE CONFIGURATION

VRTC

ST90505

572F SN905 THORAX IMPACT CAL05

TEMPERATURE 74 F

RELATIVE HUMIDITY 48 %

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
PISTON VELOCITY	13.8 - 14.2 FT/S	14.0 FT/S
PEAK ACCELERATION: UPPER RIB BAR	37 - 46 G	-40.9 G
PEAK ACCELERATION: LOWER RIB BAR	37 - 46 G	-41.0 G
PEAK ACCELERATION: LOWER THORACIC SPINE	15 - 22 G	-18.8 G

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Chas Middlette*

VRTC , ST90505

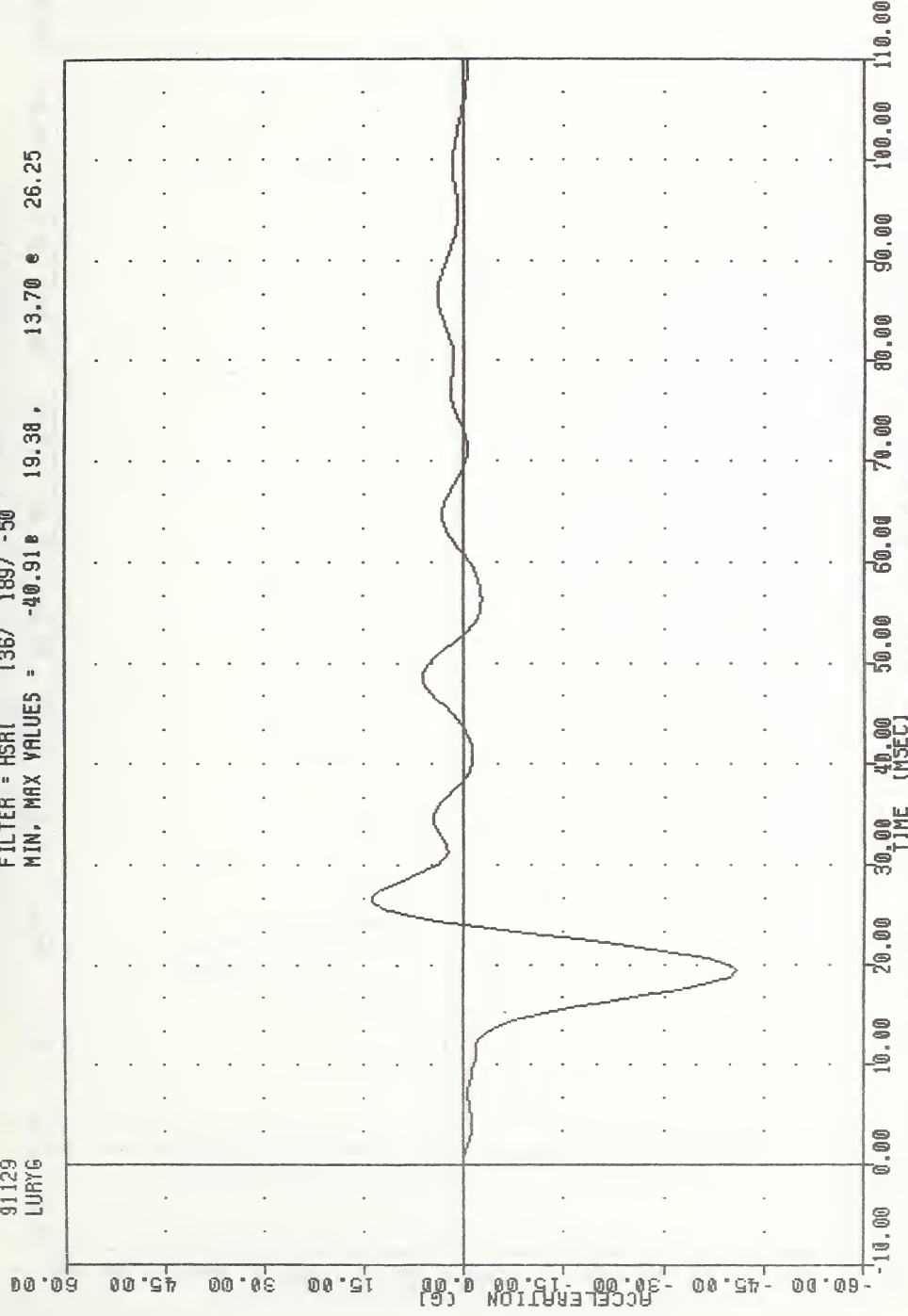
572F SN905 THORAX IMPACT CAL05

91129

LURY6

FILTER = HSR1 136/ 189/ -50

MIN, MAX VALUES = -40.91e 19.38, 13.70 e 26.25



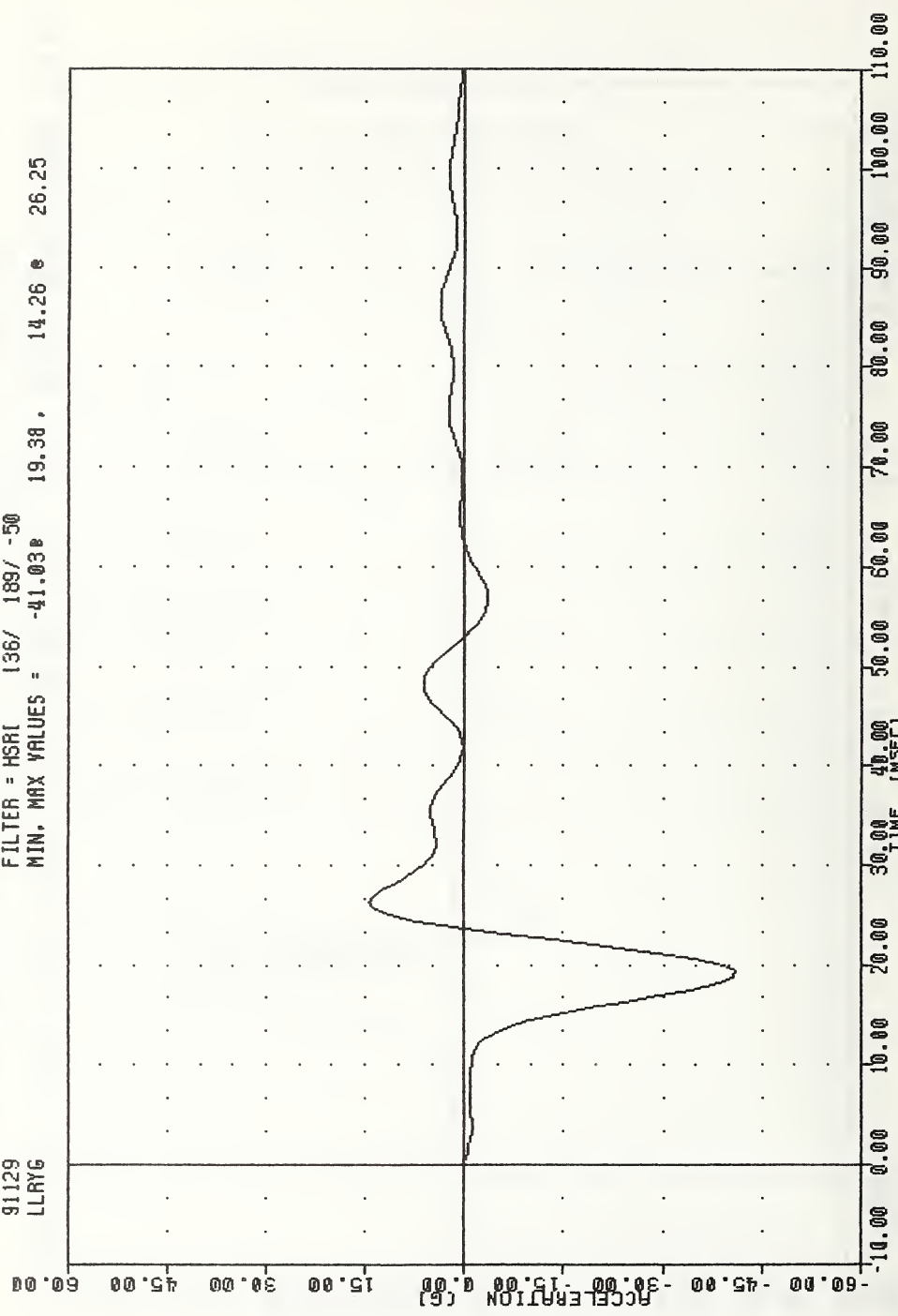
PART 572-F S.I.D. THORAX SIDE IMPACT CALIBRATION  
LEFT UPPER RIB ACCELERATION Y AXIS

VRIC , S190505  
572F SN905 THORAX IMPACT CAL05  
91129

FILTER = HSRI 136/ 189/ -50

MIN, MAX VALUES = -41.03e 19.38, 14.26 e 26.25

LLRYG



PART 572-F S.I.D. THORAX SIDE IMPACT CALIBRATION  
LEFT LOWER RIB ACCELERATION Y AXIS

VRTC \* 3190505

572F SN905 THORAX IMPACT CAL05

91129

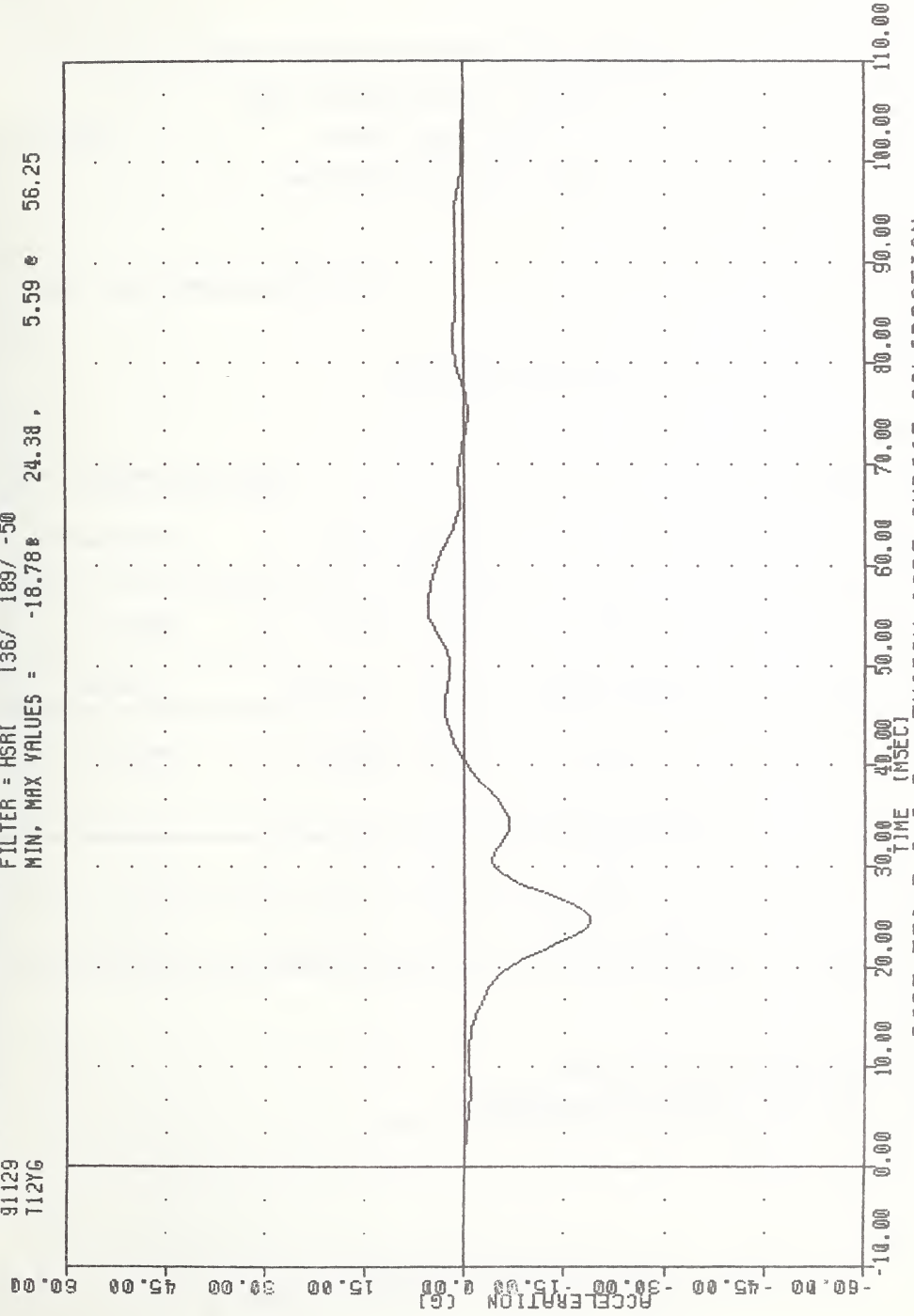
112Y6

FILTER = HSR1 136/ 189/ -50

MIN. MAX VALUES = -18.78 24.38

5.59

56.25



PART 572-F S.I.D. THORAX SIDE IMPACT CALIBRATION  
LOWER SPINE ACCELERATION Y AXIS

## TRANSPORTATION RESEARCH CENTER OF OHIO

## THORACIC SHOCK ABSORBER TESTS

SIDE IMPACT DUMMY

09-May-91

LEFT SIDE CONFIGURATION

VRTC

572F SN905 DAMPER TEST CAL05

TEST NOS. DP90505AZ, DP90505BZ, DP90505CZ

TEMPERATURE 72 F

RELATIVE HUMIDITY 48 %

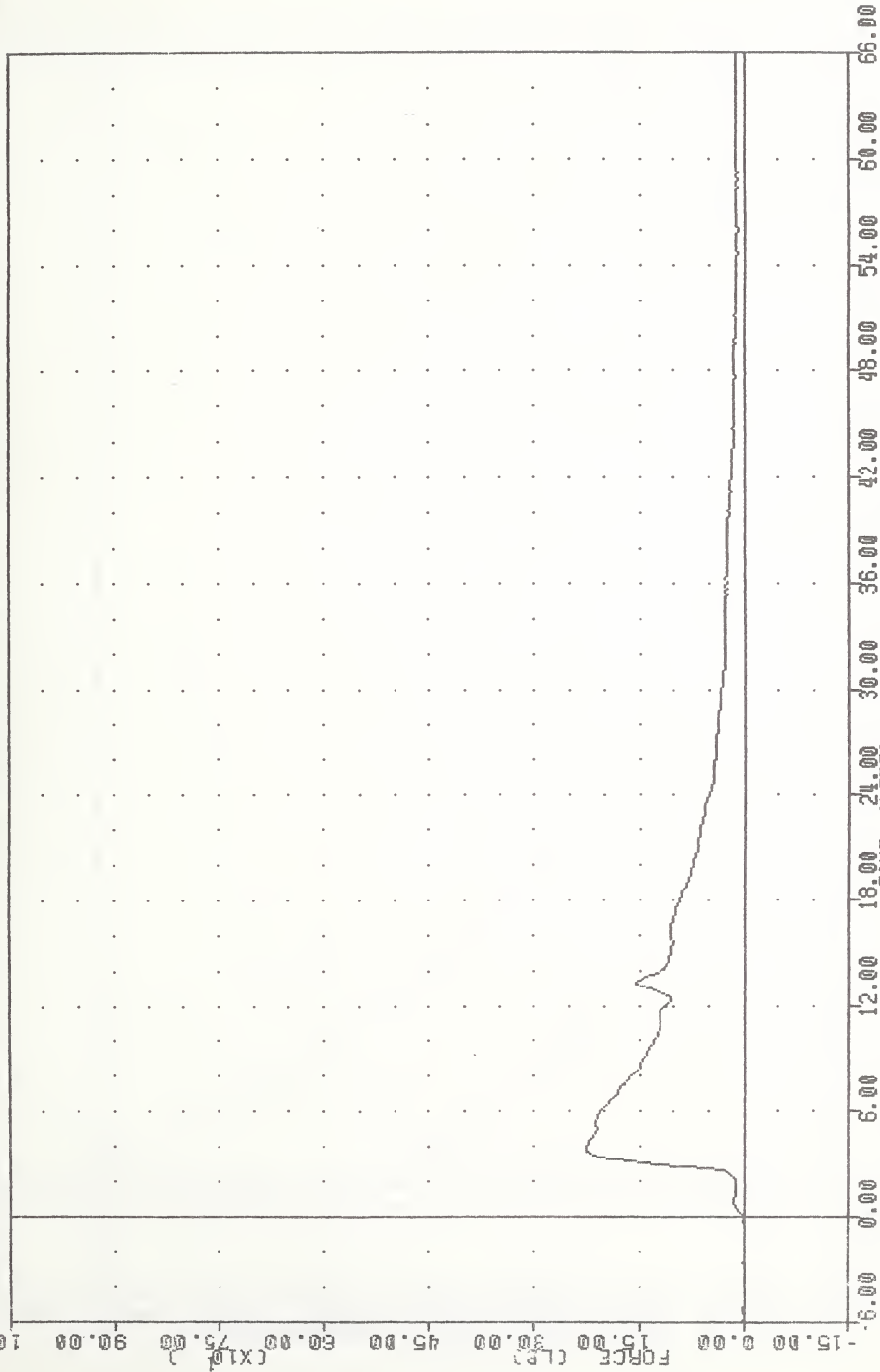
TEST PARAMETER		SPECIFICATION	TEST RESULTS
10.1 FT/S	FORCE	187 - 251 LB	226 LB
	DISPLACEMENT	1.18 - 1.38 IN	1.37 IN
14.4 FT/S	FORCE	413 - 508 LB	496 LB
	DISPLACEMENT	1.25 - 1.47 IN	1.47 IN
20.0 FT/S	FORCE	835 - 989 LB	955 LB
	DISPLACEMENT	1.31 - 1.56 IN	1.48 IN

DUMMY MEETS SPECIFICATIONS

TECHNICIAN Chas Middleton

VRTC , DF90505A  
 572F SN905 DAMPER TEST CAL05  
 91129  
 DAMPF

FILTER = ALPF 1650/ 5214/ -40  
 MIN, MAX VALUES = -0.038 -5.88 , 226.46 e 3.88

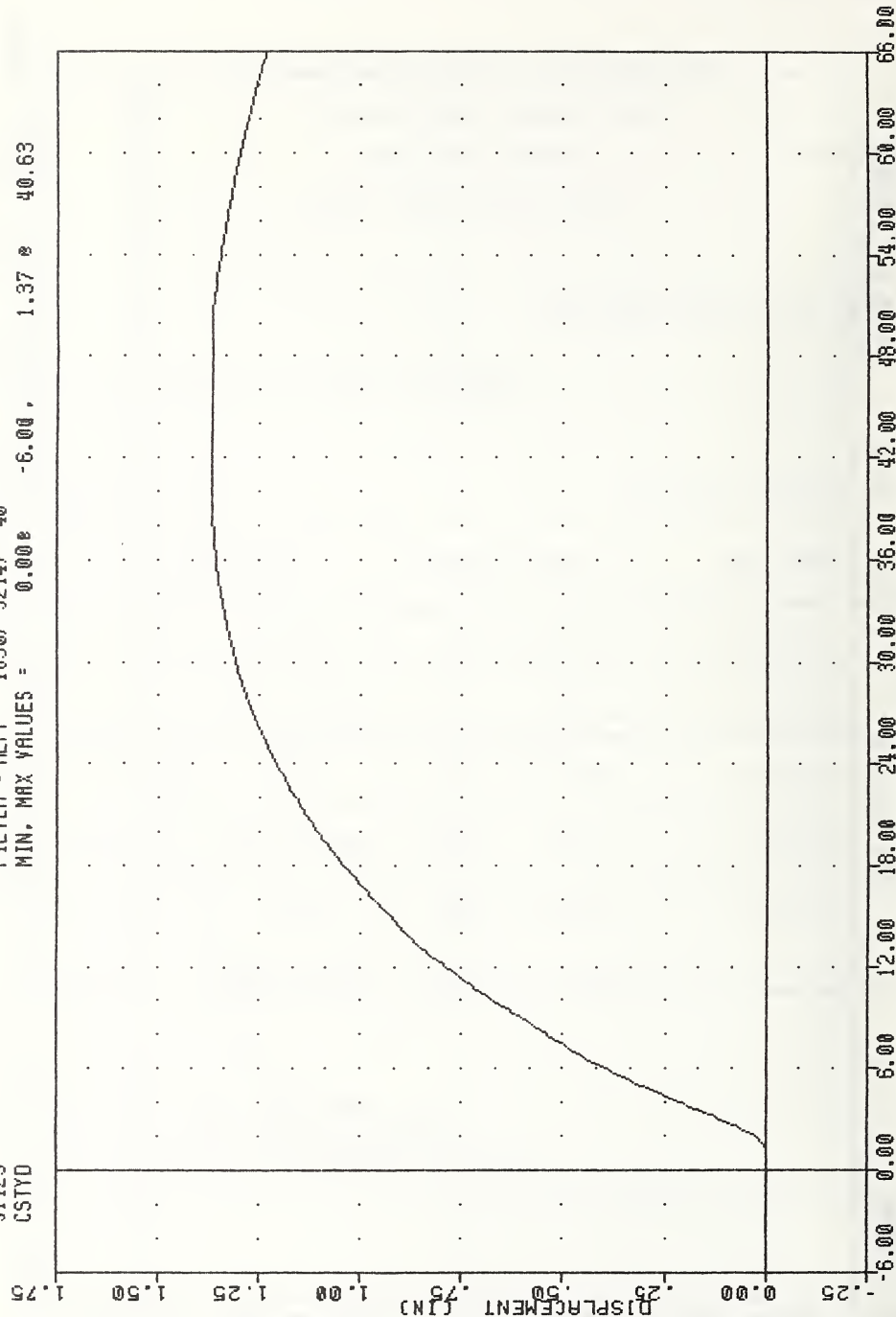


PART 572-F S.I.D. THORACIC SHOCK ABSORBER TEST 10 FT/SEC  
 DAMPER RESISTIVE FORCE



VRIC  
572F SN905 DAMPER TEST CAL05  
91129  
CSTYD

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.00e -6.00 , 1.37 e 40.63

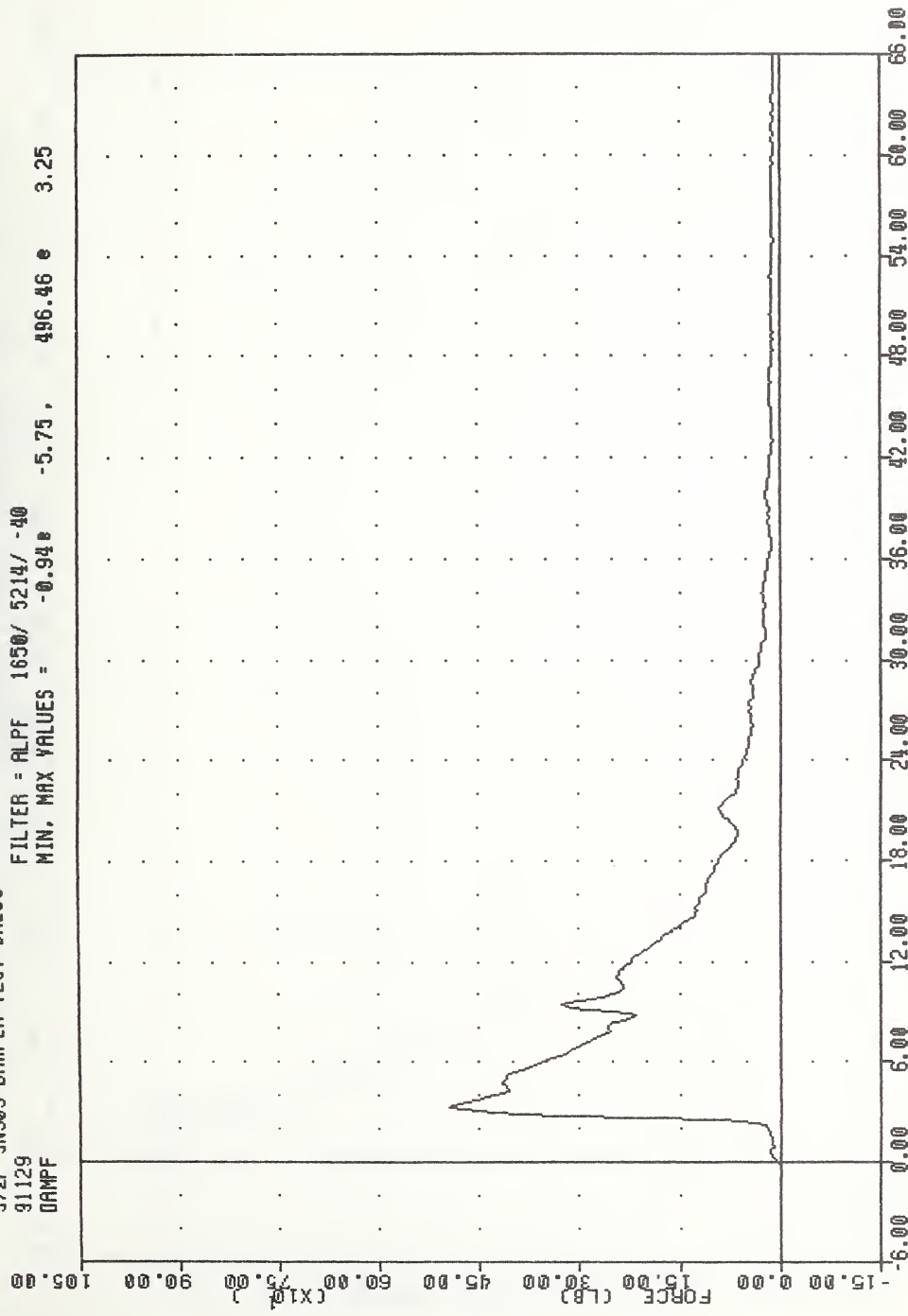


PART 572-F S.I.D. THORACIC SHOCK ABSORBER TEST 10 FT/SEC  
DAMPER DISPLACEMENT

YRTC , DP90505B  
 572F SN905 DAMPER TEST CAL05  
 91129  
 DAMPF

FILTER = ALPF 1650/ 5214/ -40  
 MIN. MAX VALUES = -0.94 e

-5.75 , 496.46 e 3.25

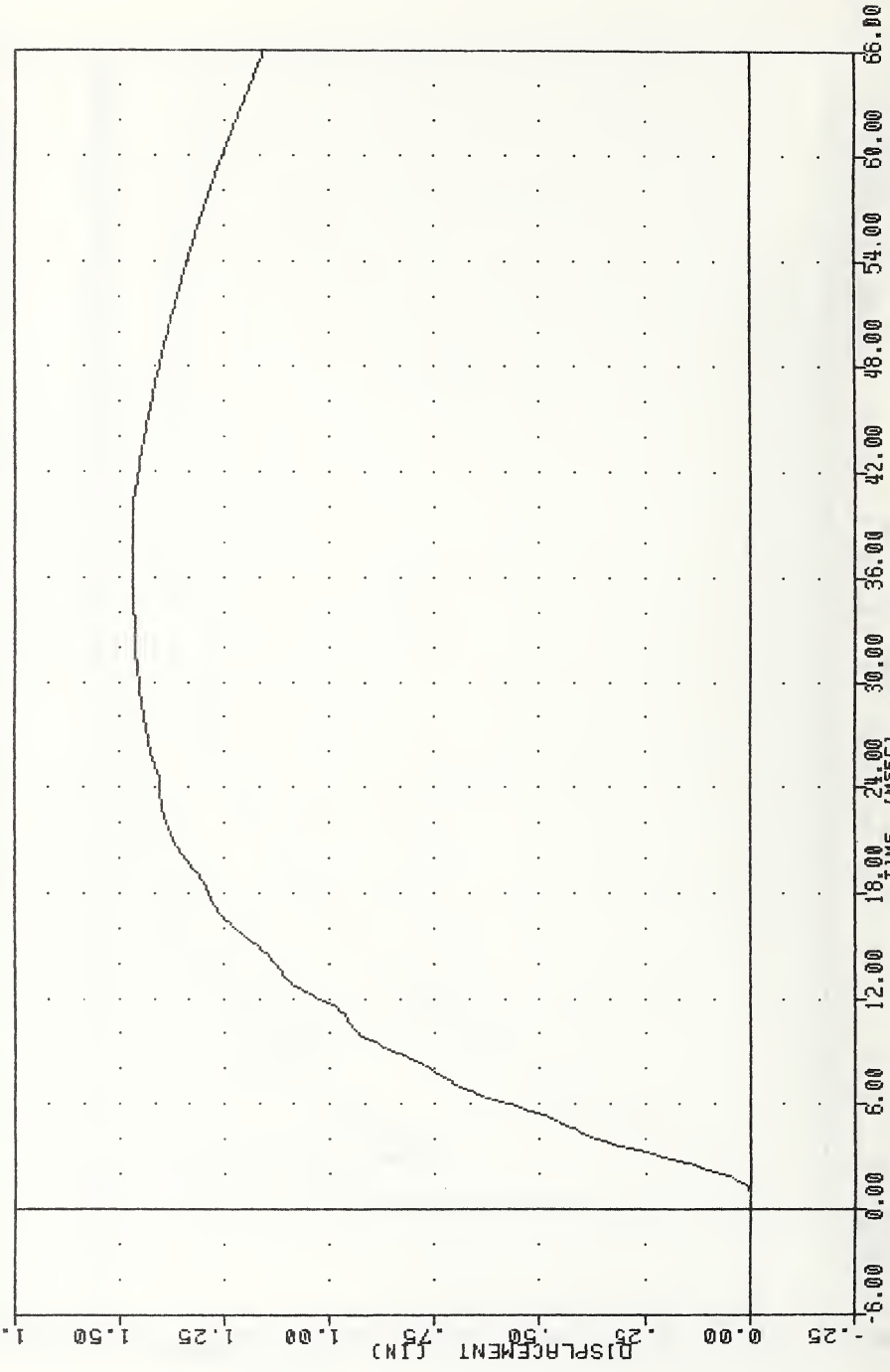


PART 572-F S.I.D. THORACIC SHOCK ABSORBER TEST 14 FT/SEC  
 DAMPER RESISTIVE FORCE

VRTC , DF905058  
572F SN005 DAMPER TEST CAL05  
91129  
CSTVD

FILTER = ALPF 1650/ 5214/ -40  
MIN, MAX VALUES = 0.00e -6.00 ,

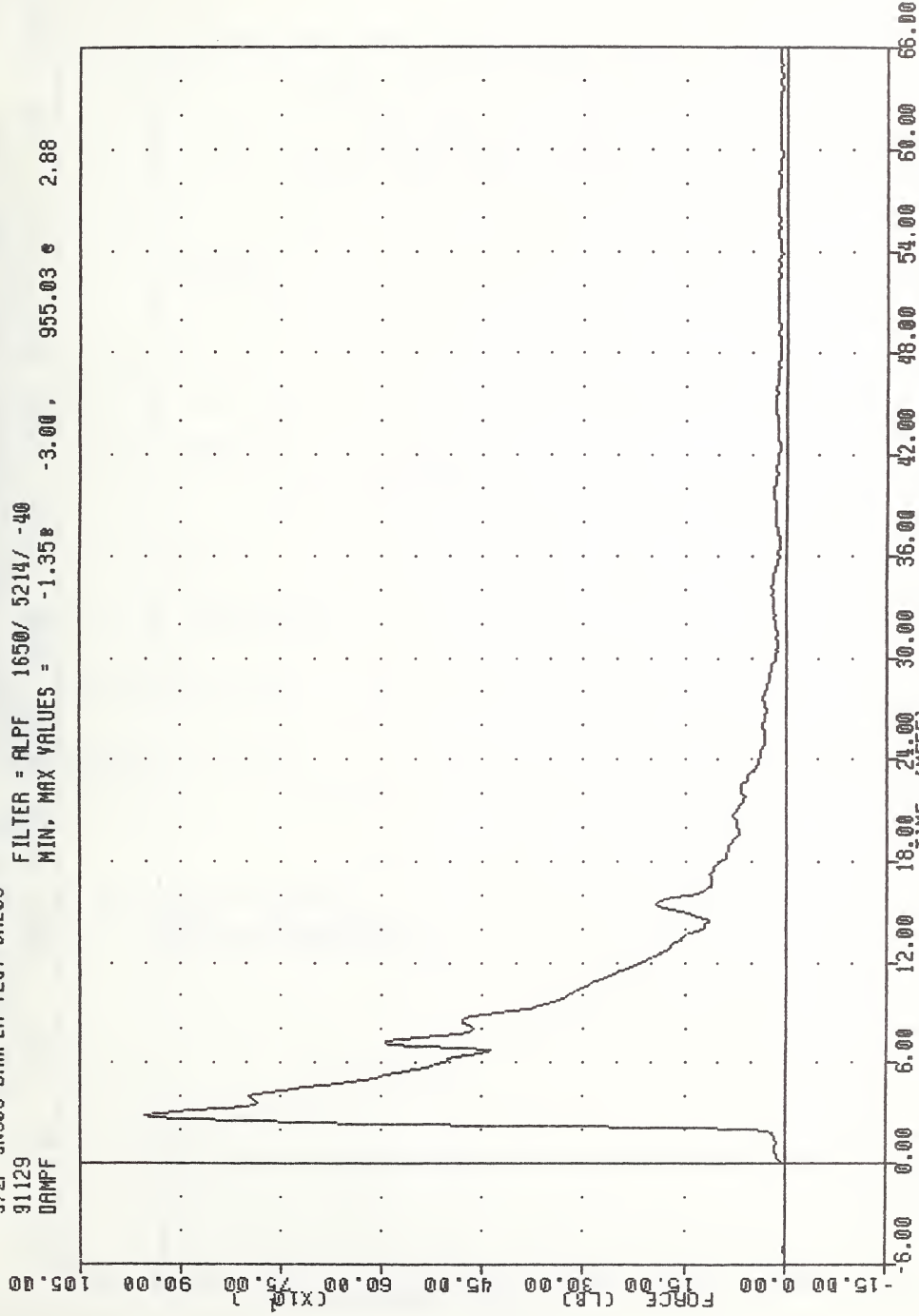
1.47 e 34.63



PART 572-F S.I.D. THORACIC SHOCK ABSORBER TEST 14 FT/SEC  
DAMPER DISPLACEMENT

VRTC , DP90505C  
 572F SN905 DAMPER TEST CAL05  
 91129  
 DAMPF

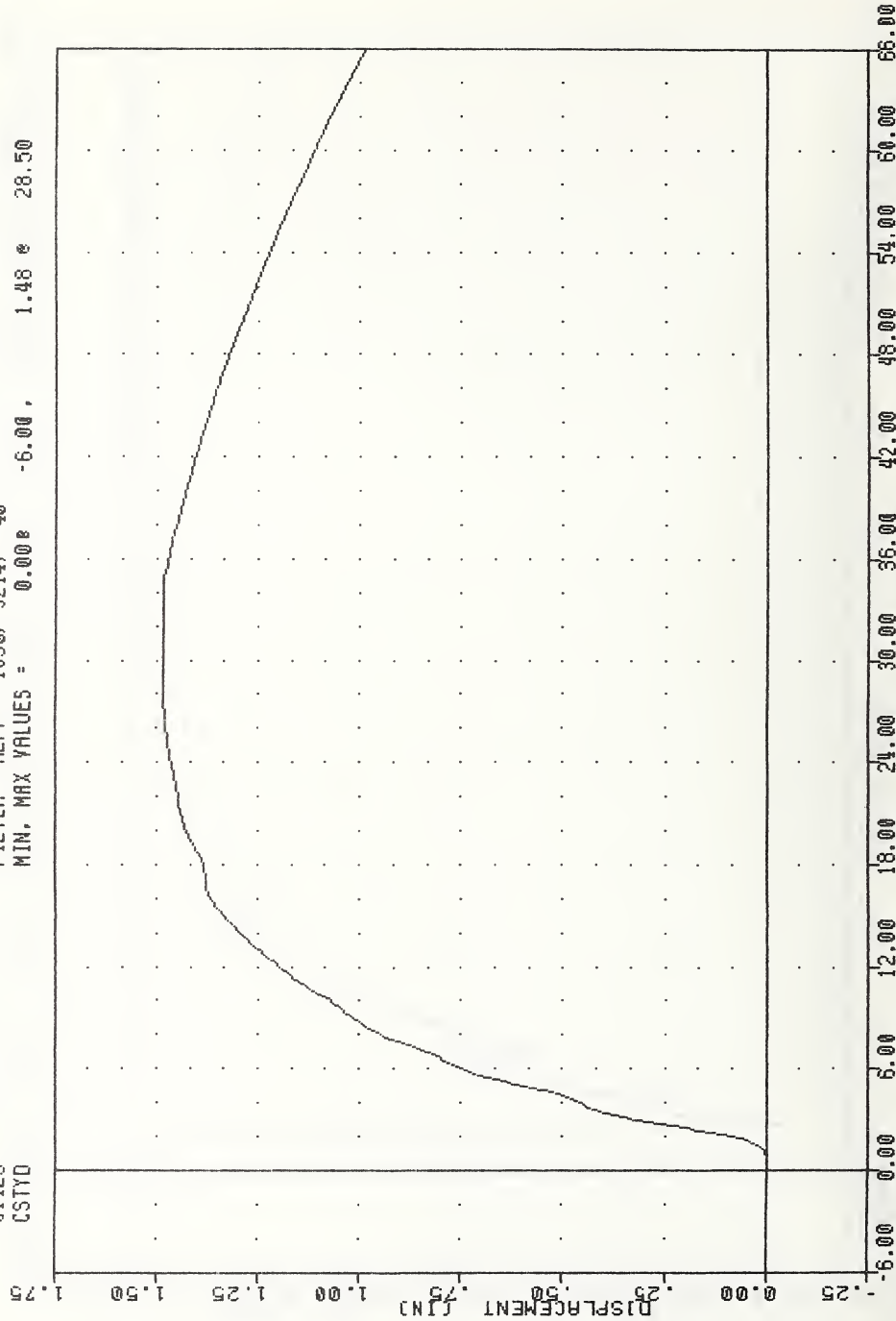
FILTER = ALPF 1650/ 5214/ -40  
 MIN. MAX VALUES = -1.35 955.03 0 2.88



PART 572-F S.I.D. THORACIC SHOCK ABSORBER TEST 20 FT/SEC  
 DAMPER RESISTIVE FORCE

VRTC  
572F SN905 DAMPER TEST CAL05  
91129  
CSTYD

FILTER = ALPF 1650/ 5214/ -40  
MIN. MAX VALUES = 0.00 8 -6.00 , 1.48 8 28.50



PART 572-F S.I.D.  
THORACIC SHOCK ABSORBER TEST 20 FT/SEC  
DAMPER DISPLACEMENT

## TRANSPORTATION RESEARCH CENTER OF OHIO

## LATERAL PELVIS IMPACT TEST

SIDE IMPACT DUMMY

13-May-91

## LEFT SIDE CONFIGURATION

VRTC

SP90505

572F SN905 PELVIS IMPACT CAL05

TEMPERATURE 74 F

RELATIVE HUMIDITY 65 %

TEST PARAMETER	SPECIFICATION (ABSOLUTE VALUE)	TEST RESULTS
PISTON VELOCITY	13.8 - 14.2 FT/S	13.8 FT/S
PEAK PELVIC ACCELERATION	40 - 60 G	-46.4 G
TIME ABOVE 20 G LEVEL	3 - 7 MSEC	5.7 MSEC
IS ACCELERATION CURVE UNIMODAL?	YES	YES

DUMMY MEETS SPECIFICATIONS

TECHNICIAN

*Chas Midell*

VRIC  
572F SN905 PELVIS IMPACT CAL05  
91133

FILTER = HSR( 136/ 189/ -50

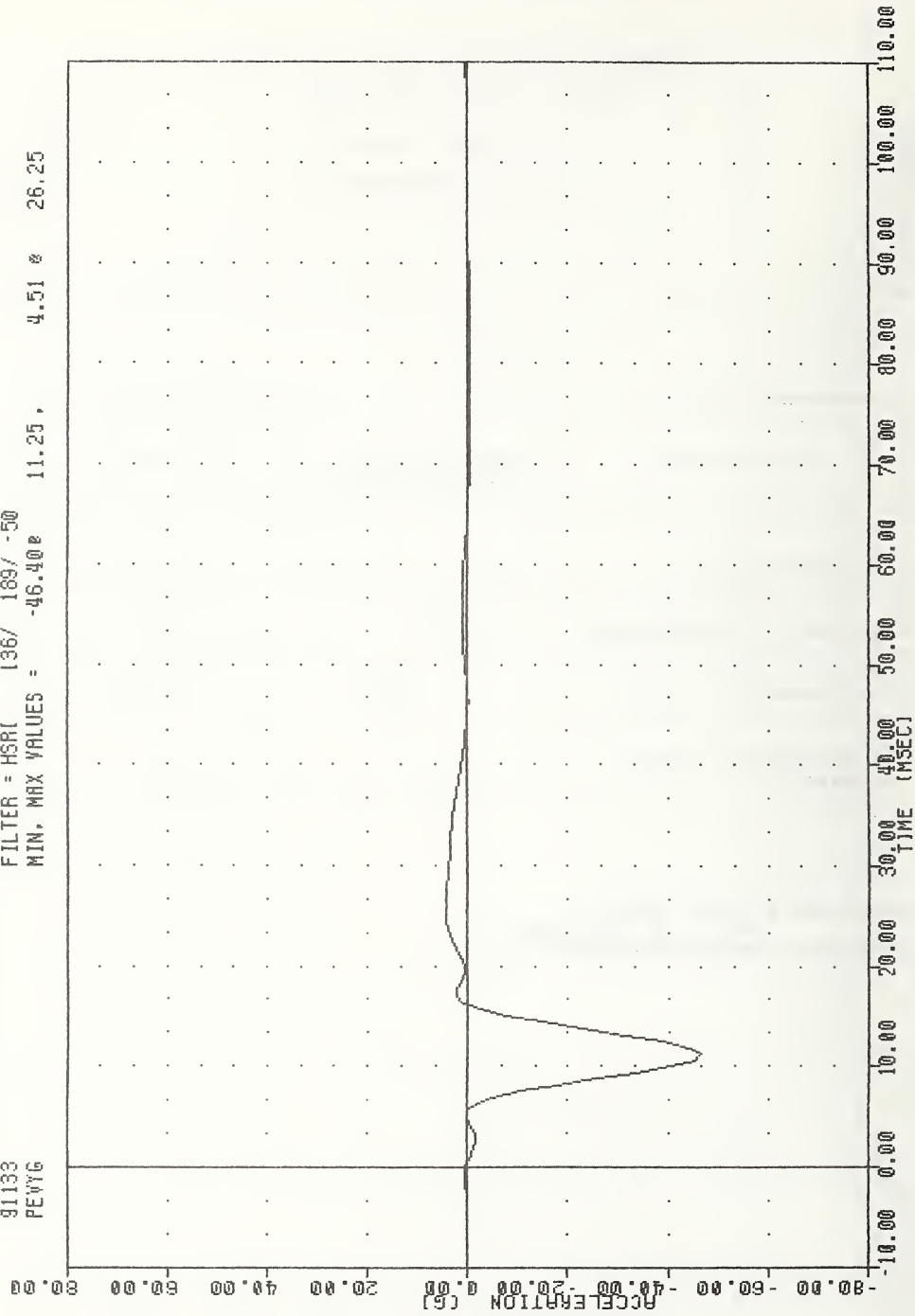
PEVIG

MIN. MAX VALUES =

-46.40e

11.25,

4.51 e 26.25



PART 572-F S.I.D. PELVIS SIDE IMPACT CALIBRATION  
PELVIS ACCELERATION Y AXIS

APPENDIX D

MISCELLANEOUS INFORMATION



DUMMY INSTRUMENTATION PLACEMENT  
DUMMY MANUFACTURER & S/N: HUMANETICS 002  
SEATING POSITION: DRIVER

MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+SENSING)
HEDXG1	HEAD	X	ENDEVCO	7264	FC01J	FRONT
HEDYG1	HEAD	Y	ENDEVCO	7264	FG28J	LEFT
HEDZG1	HEAD	Z	ENDEVCO	7264	DF48J	UP
SHLYG1	LEFT SHOULDER	Y	ENDEVCO	7264	FG31J	UP
SHLYD1	LEFT SHOULDER					
	DISPLACEMENT		SPACE AGE CONTROLS	160321-H	62	
T01XG1	UPPER SPINE	X	ENDEVCO	7264	DC54J	REAR
T01YG1	UPPER SPINE	Y	ENDEVCO	7264	DC18J	LEFT
T01YGA	UPPER SPINE	Y	ENDEVCO	7264	FJ92J	RIGHT
T01ZG1	UPPER SPINE	Z	ENDEVCO	7264	FC43J	UP
T12XG1	LOWER SPINE	X	ENDEVCO	7264	FH37J	FRONT
T12YG1	LOWER SPINE	Y	ENDEVCO	7264	FF73J	LEFT
T12YGA	LOWER SPINE	Y	ENDEVCO	7264	FG43J	LEFT
T12ZG1	LOWER SPINE	Z	ENDEVCO	7264	DC20J	UP
LURYG1	LEFT UPPER RIB	Y	ENDEVCO	7264	DC68J	RIGHT
LURYGA	LEFT UPPER RIB	Y	ENDEVCO	7264	DE99J	RIGHT
LURYD1	LEFT UPPER RIB					
	DISPLACEMENT		SPACE AGE CONTROLS	160321-H	28	
LCRYG1	LEFT CENTER RIB	Y	ENDEVCO	7264	FF79J	RIGHT
LCRYGA	LEFT CENTER RIB	Y	ENDEVCO	7264	FC60J	RIGHT
LCRYD1	LEFT CENTER RIB					
	DISPLACEMENT	Y	SPACE AGE CONTROLS	160321-H	45	
LLRYG1	LEFT LOWER RIB	Y	ENDEVCO	7264	FG33J	RIGHT
LLRYGA	LEFT LOWER RIB	Y	ENDEVCO	7264	DC72J	RIGHT
LLRYD1	LEFT LOWER RIB					
	DISPLACEMENT	Y	SPACE AGE CONTROLS	160321-H	54	
LUAYG1	LEFT UPPER					
	ABDOMEN	Y	ENDEVCO	7264	ET91J	RIGHT
LUAYD1	LEFT UPPER ABDOMEN					
	DISPLACEMENT	Y	SPACE AGE CONTROLS	160321-H	60	

DUMMY INSTRUMENTATION PLACEMENT CONTINUED

DUMMY MANUFACTURER & S/N: HUMANETICS 002

SEATING POSITION: DRIVER

MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+SENSING)
LLAYG1	LEFT LOWER					
	ABDOMEN	Y	ENDEVCO	7264	FB67J	RIGHT
LLAYD1	LEFT LOWER ABDOMEN					
	DISPLACEMENT	Y	SPACE AGE CONTROLS	160321-H	109	
PEVXG1	PELVIS	X	ENDEVCO	7264	EW44J	FRONT
PEVYG1	PELVIS	Y	ENDEVCO	7264	FJ66J	RIGHT
PEVZG1	PELVIS	Z	ENDEVCO	7264	FG97J	UP

DUMMY INSTRUMENTATION PLACEMENT  
DUMMY MANUFACTURER & S/N: VRTC 905  
SEATING POSITION: LEFT REAR PASSENGER

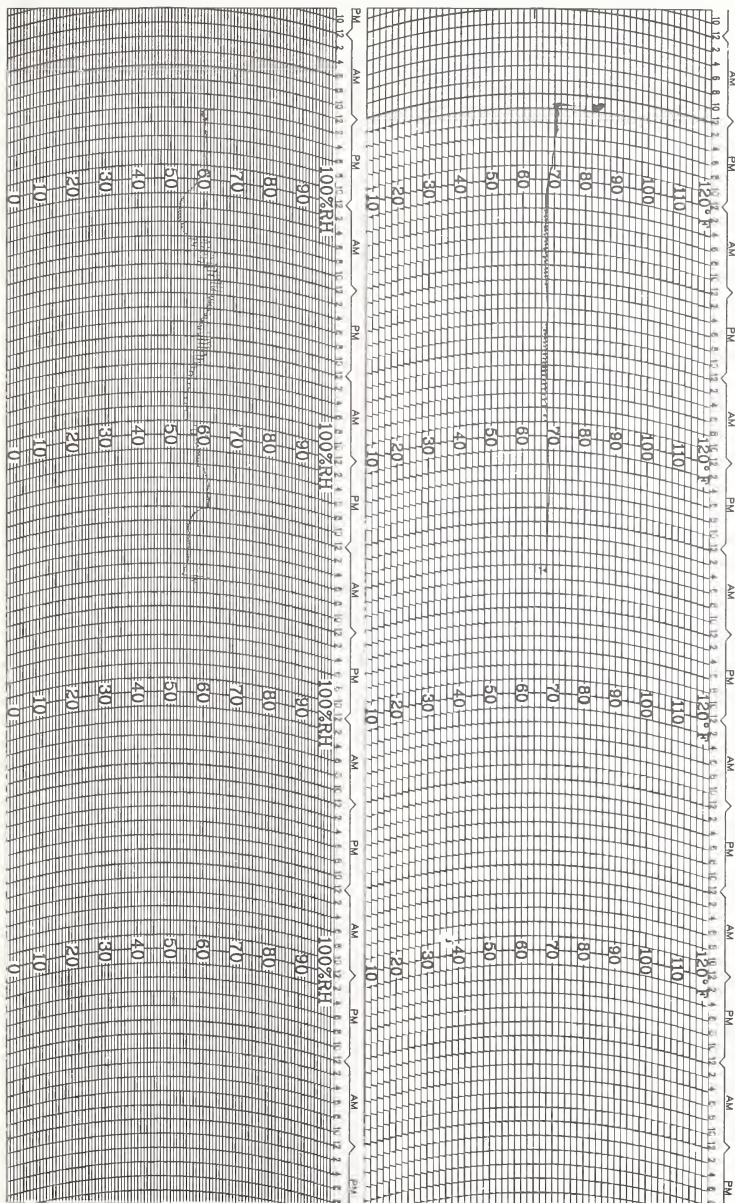
MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+SENSING)
HEDXG4	HEAD	X	ENDEVCO	7264	BP55J	REAR
HEDYG4	HEAD	Y	ENDEVCO	7264	BE62J	LEFT
HEDZG4	HEAD	Z	ENDEVCO	7264	BD91J	UP
T01XG4	UPPER SPINE	X	ENDEVCO	7264	B098J	REAR
T01YG4	UPPER SPINE	Y	ENDEVCO	7264	DG87J	LEFT
T01ZG4	UPPER SPINE	Z	ENDEVCO	7264	EK16J	UP
T12XG4	LOWER SPINE	X	ENDEVCO	7264	EC41J	FRONT
T12YG4	LOWER SPINE	Y	ENDEVCO	7264	EH88J	LEFT
T12YGD	LOWER SPINE	Y	ENDEVCO	7264	EJ59J	LEFT
T12ZG4	LOWER SPINE	Z	ENDEVCO	7264	DE15J	UP
LURYG4	LEFT UPPER RIB	Y	ENDEVCO	7264	EJ62J	RIGHT
LURYGD	LEFT UPPER RIB	Y	ENDEVCO	7264	CA49H	RIGHT
LLRYG4	LEFT LOWER RIB	Y	ENDEVCO	7264	EJ97J	RIGHT
LLRYGD	LEFT LOWER RIB	Y	ENDEVCO	7264	BE69J	RIGHT
CSTYD4	CHEST					
	DISPLACEMENT	Y	BOURNS	5185	0483-280	
PEVXG4	PELVIS	X	ENDEVCO	7264	BH95J	REAR
PEVYG4	PELVIS	Y	ENDEVCO	7264	BD53J	LEFT
PEVZG4	PELVIS	Z	ENDEVCO	7264	BF11J	UP

## VEHICLE INSTRUMENTATION PLACEMENT

MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+SENSING)
RFSXG	RIGHT FRONT SILL	X	ENDEVCO	2264	AR38	FRONT
RFSYG	RIGHT FRONT SILL	Y	ENDEVCO	2264	AN45	LEFT
RFSZG	RIGHT FRONT SILL	Z	ENDEVCO	2264	AK21	UP
RRSXG	RIGHT REAR SILL	X	ENDEVCO	2264	BB60	REAR
RRSYG	RIGHT REAR SILL	Y	ENDEVCO	2264	AS06	LEFT
RRSZG	RIGHT REAR SILL	Z	ENDEVCO	2264	AS76	DOWN
RDKXG	REAR DECK	X	ENDEVCO	2264	AX88	REAR
RDKYG	REAR DECK	Y	ENDEVCO	2264	BA68	LEFT
RDKZG	REAR DECK	Z	ENDEVCO	2264	AV27	UP

# VEHICLE INSTRUMENTATION PLACEMENT

MNEMONIC	LOCATION	AXIS	MFR	MODEL	S/N	ORIENTATION (+SENSING)
BCGXG	CENTER OF GRAVITY	X	ENDEVCO	2264	AS03	FRONT
BCGYG	CENTER OF GRAVITY	Y	ENDEVCO	2264	AS71	LEFT
BCGZG	CENTER OF GRAVITY	Z	ENDEVCO	2264	AR49	UP
BRCXG	REAR CROSSMEMBER	X	ENDEVCO	2264	AY13	REAR
BRCYG	REAR CROSSMEMBER	Y	ENDEVCO	2264	AS95	RIGHT



WeatherMeasure  
WEATHERtronics  
Division of QUALIMETRICS, Inc.

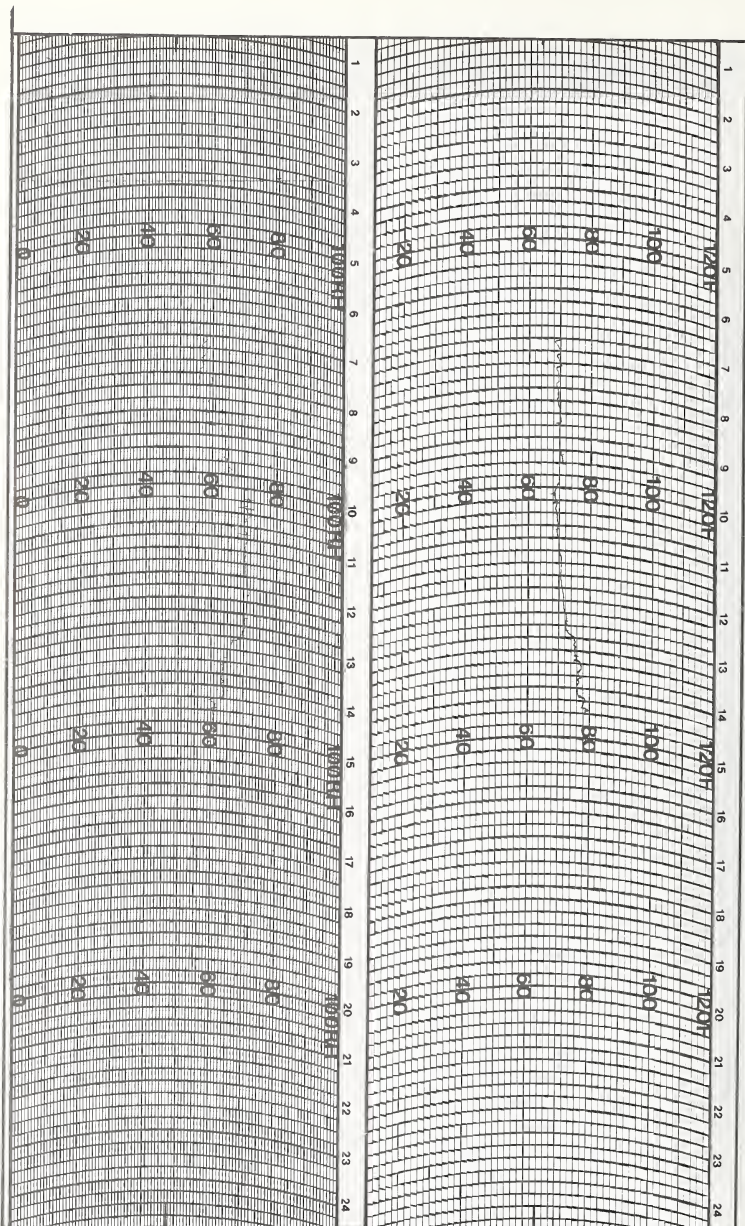
P.O. BOX 41039  
SACRAMENTO, CA 95841  
TELEPHONE: (916) 481-7565

HYGROTHERMOGRAPH  
7 DAY

CHART NO. M999124  
C311-W-HF  
ECN 2563

STATION BSU Dunes DATE ON 5/17/91 DATE OFF 5/24/91





WEATHER MEASURE  
P.O. BOX 41257  
SACRAMENTO, CA. 95841  
PHONE (916) 481-7565

HYGROTHERMOGRAPH  
1 DAY

CHART # C311 D HF  
PART # 699123

STATION Milwauk P 5V DATE ON 5/20/91 DATE OFF 5/20/91

TL 242 .S.

Sankey, J

Evaluation  
dummy

Form DOT F 1  
FORMERLY FORM



DOT LIBRARY



00092581